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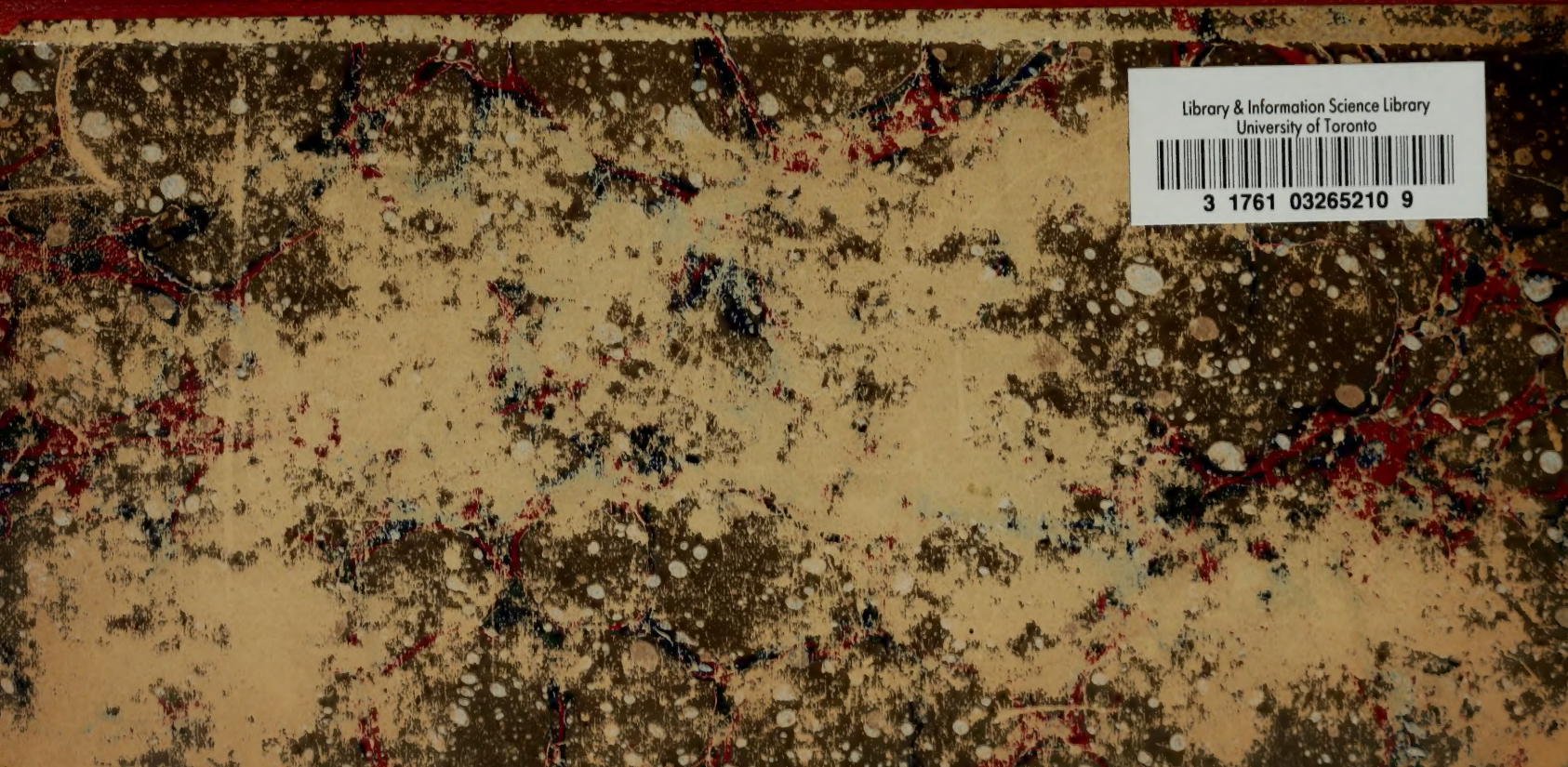

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SUBJECT ANALYSIS SYSTEMS
COLLECTION

MASS. INSTITUTE OF TECHNOLOGY
WITHDRAWN
M. I. T.
LIBRARIES

Systematic Code

for

The Relative Decimal Classification

of

A Card Bibliography

of

Electrochemistry and Allied Subjects

Amplifications by
A. L. Voge.

Price, 50 cents, or 2 sh.

Zürich
Concilium Bibliographicum
August, 1905.

APR 1906

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„So rapid are the strides made by science in this progressive age and so boundless is its range that those who view its career from without find great difficulty in following its diverse and intricate path-ways; while those who have secured a footing within the same road are often quite unable to keep pace with its fleet movements and would fain retire from the unequal contest. It is not surprising then that those actually contributing to the advancement of science, pressing eagerly upward and onward should neglect to look back upon the labors of those who precede them and should sometimes lose sight of the obligations which science owes to forgotten generations.“

H. Carrington Bolton.

The Card Catalog

to the

Current Literature of Electrochemistry.

The Wants to Be Filled.

To-day in all research work, much of the scientist's time is expended in locating the literature of his subject; yet finally the most conscientious worker must leave that search incomplete, he must remain in ignorance of valuable suggestions that would have advanced his work.

More helpless is the manufacturer. He cannot hope to know what has been done the world over in his industry, or toward improvements that continually suggest themselves to him. He may purchase some book of reference. Little of its contents applies to his case, and he knows that this can scarcely form a complete statement of what the world has published on the subject.

Most helpless the inventor, who generally with no facilities for literature searching, must grope along upward over the failures of his own ideas, the costly scrap-heap. The result is that but one per-cent of the patents to-day have any market value.

Who can foresee all of the applications of a given principle, process or product? An electric furnace is designed for a specific purpose; but it may be found that its underlying principles are equally applicable to other uses, to the manufacturer of calcium carbide or aluminum, perchance. Aluminum has a value as a material for utensils, because one of its properties is great resistance to chemical action. It has other applications because another of its properties is lightness. It has still other uses in metallurgy as a reducing agent for ores, because a third property

72440

is a powerful chemical affinity at high temperatures for oxygen. Information regarding actual applications is invaluable to the producer. It aids him in introducing his manufacture — in increasing his sales. Such information to-day cannot be secured with any approach to completeness.

What specialist pretends to know all of the latest books and articles that have been published in his specialty? Through this ignorance, his capabilities are greatly limited.

These are things that individual effort can, it is true, never attain, but it is conceivable that all of them could be accomplished by an organization.

What Must Be Accomplished.

There are three needs which all bibliographies should aspire to fill. These are: to give the seeker complete and accurate information on a subject, to give only such information as he desires, and to give it inexpensively.

To give **complete and accurate** information on any subject, the bibliography at the start must specialize. Such a work treating, from the start, all branches of chemistry would probably be imperfect in electrochemistry. Furthermore it is essential to completeness that the latest work shall be included. This condemns at once the book bibliography, for it becomes out of date while going through the press.

To give **only** such information as the investigator desires again breaks with the traditions of book-bibliographers. If an annual issue, it necessitates searching through twenty-five volumes and their twenty-five indices to scan the work of as many years; laboring through innumerable references foreign to the subject in hand. A system must be adopted in which the new and old references on any minute subject can be brought together at one single place.

The **cheapness** of a bibliography to the purchaser depends upon his being able to secure just the choice of references that he desires and upon the simplicity and economy of the system of classification by which it is prepared.

Another demand on the bibliography is the possibility of arranging the references either according to authors or subjects.

Manner of Accomplishment.

To secure a **complete** bibliography it is necessary that a complete file of the journals to be excerpted should be accessible. So the institute **must** be located in a town with good library facilities. It must receive books and journals from publishers, reports of their proceedings from societies, and reprints from authors themselves. Many journals other than those devoted to our subject must be reviewed and all excerpting must be based on the contents rather than on the title of the article. Finally because many articles treat of relationships between different branches of the subject, the references must be duplicated under all branches concerned.

To present **only** the information demanded, an expansible system must be adopted. A book is bound; a card catalog is expansible. A card reference to an article on Gadolinium appearing in 1910 might lie next to a card on this

subject bearing the date 1905. The searcher can thus be shown where to find only the cards and references to his subject.

Any card system can be made to satisfy the demands of completeness and discrimination A simple alphabetical system suffices for the arrangement of the cards by authors. But the subject classification is the more important and permits of a much wider application. One more frequently wants to know what has been published in regard to a given subject than to have a list of the works of a given author. The subject matter of a scientific paper also leaves a deeper impression than does the author's name, which one appreciates if at a later date an attempt is made to find the paper without a subject index. The cheap production of such a classified bibliography will depend greatly upon the system of indexing employed: since this fixes the cost of the labor of sorting and selecting the cards

For this subject classification, a system is required where references on a common subject matter are not liable to be separated by entry under synonomous terms; e. g. the classification of references under Wolfram and Tungsten. To be of universal service, a system is required where the classification moreover will not be controlled by the language of any country in which the article is written or the bibliography published The classification should be based purely upon the character of the products or principles treated of in the articles — it should be one of related subjects.

To adopt such a relative subject system that permits of expansion of all topics and to manipulate its cards cheaply and with speed, a symbol must be assigned to each topic. Experience has shown that the use of Arabic numerals is most advantageous and applied as decimals, they reduce arrangement to its simplest form, and permit infinite subdivision of the subjects represented by numerical symbols.

The relative subject decimal system seems superior to others for an economical bibliography that will give the scientific and technical student only the references to his own branch and that will give him all such references.

How the Wants Will Be Filled.

In selecting the decimal symbols for the subjects it seems wisest to follow the system most widely used, that of Melvil Dewey, Librarian of the New York State Library, and developed by the International Institute of Bibliography of Brussels and the Bureau of Bibliography of Paris. 1)

Considering that the primary function of such a bibliography is to point out matter that would have been otherwise overlooked, it is evident that from the American standpoint the best possible location for the institute is the center of Europe; for it is the Proceedings of some scientific society in a hidden corner of Germany or Italy that would be most probably overlooked. In Switzerland with its three national languages, such publications are most easily found.

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1) An explanation of this system introduces the decimal code which follows in this pamphlet.

Appreciating these advantages, the Concilium Bibliographicum [2]) was founded by scientific societies at Zurich, Switzerland in 1895, using for its bibliographies the decimal system mentioned above. The electrochemical bibliography will be published by a branch of this institution.

Subsidized by the Swiss Confederation, the facilities of the Concilium for employing the public libraries of the entire country are unexcelled. Indeed such journals as do not appear in the Zurich libraries are loaned to the institute by those of Geneva, Basel, and Berne. Some journals of interest are lacking and it will be the first care of the institute to secure those needed. The patents of the most important countries are also accessible at the Polytechnic Institute of Zurich. As a member of the German book trade, the Institute can obtain all new books published in Germany, Austria and Switzerland for reviewing. Most of the Dutch and Scandinavian publications can be obtained in this way as well as the works of all publishers having agents in Leipzig.

The subjects included in this bibliography are shown in detail by the code affixed to this pamphlet. The references that will be found under certain subjects in the code will not, it is true, be exhaustive since, under any subject, only articles relating to electrochemistry will be classified.

Only original articles will be given separate cards, but an effort will be made to cite reviews and reprints together with the original.

The choice and classification of the references will all be undertaken by an electrochemist with several years of both scientific training and practical experience.

The Institute has its own printing establishment, setting and printing all of the cards of its bibliographies.

Results of the Work of the Institute.

At the beginning, in the catalog of electrochemistry there will be about 5000 original references per year, exclusive of duplications of the same article under different subjects. This duplication will probably double the number of cards. No guaranteed limit, to the number of original references can be given.

The work of the institute will result in five compilations:

1. A magazine catalog containing the titles and various data of all magazines that are worked through.

2. The author catalog with the cards arranged in simple alphabetical order under the author's name and with cross-references for articles prepared by two or more authors.

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2) The Concilium Bibliographicum is a central agency founded by the International Congress of Zoology with the financial support of the Swiss Confederation, the Canton, and City of Zurich, the Zoological Station of Naples, the Elizabeth Thomson Fund, the American Association for the Advancement of Science, the Zoological Society of France, the American Microscopical Society and of numerous private donors. The accounts of the institution are audited for the subsidizing bodies by a committee appointed by the Swiss Society of Naturalists. The work of the Concilium consists in collecting bibliographical notices, from all current publications in Zoology, Paleontology, Microscopy, Anatomy and Physiology, and of printing and distributing these in card-form.

3. The catalog of primary cards with each article classified according to its most salient feature.

4. The catalog of auxilliary cards with the same citations as the primary catalog but classified under secondary subject-heads according to properties, generalities, or the 'points of view' from which the subject has been treated. To distinguish the duplicates from the original cards, that part of the symbol which decides the primary classification of the card is printed in black-face type while the symbol, for the auxillary card or for the affix is in ordinary type. s)

Unless there is sufficient demand, the magazine catalog and the catalog of references arranged by journals will only exist in manuscript form or in a single edition at the institute. All primary, auxilliary, and author cards will, it is hoped, be kept in stock systematically arranged.

Operations in the Institute.

Two editions of all references will be printed differing only in the quality of the paper used. One of strong permanent white stock, the other of a good thin brown paper weighing respectively 200 grams and 120 grams per hundred cards. The latter edition is cheaper and occupies less space but is less durable. These cards are all cut to the standard American library size—$7^1/_2$ by $12^1/_2$ cms., and are punched for the rods of standard card drawers.

The following will show the character of the information and its general arrangement to be found on each card, and represents a card of standard size.

Bancroft, Wilder D. **357.5.003**

1903. Electrolytic Copper Refining. **Trans. Amer. Electrochem. Soc. Vol. 4 p. 55—82.** [Conditions influencing efficiency of plant operation.] .031.8,.041,.057.1

In Bibliographia Universali — 669

edidit Concilium Bibliographicum.
Typographia Concilii Bibliographici

s) It is clear that the auxillary and primary bibliographies will supplement each other and not over-lap.

In the upper right-hand corner is the decimal symbol denoting the classification of the article. This guides the card to its place in the subject catalog. The author's name in heavy type occupies the first line to the left facilitating the insertion of the card in an author catalog. On the next line in heavy type is the date of publication of the article which is useful for another classification of cards bearing the same decimal symbol. This is followed by the title of the article as given in the magazine from which it was excerpted, and when in a language other than English, the title will be followed by an English translation. The abbreviated title of the magazine, the number of the volume, the page limits of the article, and a statement of any illustrative plates and figures are then given, frequently followed by an explanatory note concerning the contents of the article. If the article is of a general character, after the reference there will be printed the symbols of the sub-groups of the subject treated in the article. In the illustrative card shown **.031.8** means "process efficiency" **.041** means "quality of deposit" and **.057.1** "current density" and "circulation."

The bureau will arrange all of the cards of a shipment in regular decimal sequence.

All cards will be packed in strong card-board boxes.

How to Use the Bibliography.

The bibliography is made up of two distinct parts; the card catalog and the code or key. This latter consists of two sections. First a printed tabulated code of subjects grouped relatively by means of their prefixed decimal symbols. Second a printed alphabetical list of subjects and synonyms with the decimal assigned to each.

Anyone wishing to study a subject may look in the classified code and trace his subject from its relationships. An investigator looking for articles on "Damage to street-mains by stray electric currents", turns through his code to **621.3** "Electrical engineering" and goes to its division **621.31** "Production and transmission of electricity". Here he finds a subdivision **621.315** "Transmission, Wiring", and this contains the group **621.315.2.** "Underground transmission" which in turn includes the section **621.315.25** "Electrolysis due to underground transmission".

But the system presents another method for looking up any subject. Employing the alphabetical list of subjects, our student locates the subject-head 'Conduit electrolysis' 'Corrosion'or 'Electrolysis' and under any one of these he will find a sub-head referring to his subject; and following that sub-head its number, **621.312.25**. The cards he now seeks under this number in the card-drawers.

To assist in the search through the card-drawers, guides may be placed at the head of the various groups of cards as shown in the accompanying illustration. On the tongue of each of these and extending above the cards is printed the symbol and its subject for the immediately following cards.

111 General
112 Liquids
113 Gases
114 Solutions
115 Photochemistry
116 Thermochemistry
117 Electrochemistry
118 Magnetochemistry
119 Solids Etc.

In Bibliographia Universali — 54

edidit Concilium Bibliographicum.
Typographia Concilii Bibliographici.

Membership. Subscribing. Orders.

As in all work of the Concilium, the Section for Electrochemistry will be devoid of any mercantile purposes. It aims to be merely self-supporting.

It has been found desirable to institute a system of membership to the Section of Electrochemistry. Such membership will incur no expense or responsibility save the payment of the yearly dues of 25 cents. Any one desiring to become a member should send us the accompanying card properly filled in. Members are entitled to a considerable reduction on all orders and to a copy of pamphlets published by the section. Regular subscriptions will be accepted to any subjects possessing definite numbers in the code.

The size and regularity of the order however, must greatly affect the rate necessary to charge per card.

The following are the approximate rates including postage, for regular subcriptions to members.

Cards per year.	White cards per card (in American cents)	Brown card per card (in American cents)
Over 3000	0.5	0.4
2000—3000	0.7	0.6
1000—2000	0.9	0.8
500—1000	1.5	1.4
250—500	2.0	1.9
100—250	2.5	2.4
Less than 100	3.0	2.9

To the above 20% is to be added for irregular orders from subscribers.
„ „ „ 30% „ „ „ „ „ orders from non-subscribers.

The rates for the primary and auxilliary cards are the same. Guides will cost one cent apiece or 60 cents per hundred.

Payments are to be made yearly to the Concilium Bibliographicum, Zurich or to Mr. Edward S. Field, 427 Broadway, New York.

Two months' notice is required to suspend a subscription.

Setting Up the Catalog.

Tightly packed 1000 white cards occupy a depth of about 9 inches; but in use only about 1000 should be stored in the standard 13-inch card drawer. 1000 brown cards occupy a depth of 5 inches consequently 1800 can be stored conveniently in a similar card drawer.

Card cabinets can be secured from the Concilium but American subscribers will find it less expensive to turn to American houses such as the Library Bureau of Boston.

The alphabetical index is under preparation and we will shortly be able to supply all subscribers with it.

Although it is intended at present to confine the blibliography to current literature and patents, the Electrochemical Section has compiled a complete set of references to the electrochemical patents of Switzerland. The publication of a subscription edition of these cards is under consideration. The set, comprising references to over 1000 patents would cost not over ℳ 8.00.

Members and friends of the institute can greatly further our work by having sent to it the proceedings of societies, separata, and all journals not regularly received in Zurich libraries. They can aid it greatly by acquainting public libraries with its existence and showing them the value of the bibliography to their patrons.

It is purposed to extend gradually the work of the Concilium to other branches of science.

The Relative Decimal Code

for

Electrochemistry.

Introduction.

The Dewey Relative Decimal System which forms the basis of this code was first devised by Melvil Dewey, Librarian of the New York State Library in 1873 for cataloging books according to the subject treated. The main classes chosen by him then have since received more and more detailed subdivision.

This system divides all knowledge into ten groups and assigns to each, one of the ten Arabic numerals. The system then divides each of these groups into its main branches in related sequence and assigns to each branch a decimal of the numeral which designates the main group. .5 means Natural Science for instance and .54 means Chemistry[4]). In this manner Dewey carried the subdivision to the fourth or fifth decimal. Electrochemistry plays an important part in four of these main branches; in physics and chemistry, in engineering and chemical technology.[5])

Even five decimal places are however insufficient when applied to bibliographical practice and the divisions of these main branches have more recently been greatly subdivided in many directions by the International Institute of Bibliography of Brussels and the Bureau Bibliographique de Paris and finally at the Concilium Bibliographicum.

The general principle of the decimal system is perhaps best shown by an illustration.

54	means	Chemistry.
54 1	„	Theoretical chemistry.
54 11	„	Physical chemistry
54 117	„	Electrochemistry (theoretical).
54 117.4	„	Conductivity, Electrolysis and Polarization.
54 117.44	„	Electrolysis. Electrolytes.
54 217.444	„	Actions and effects of electrolysis.
54 217.444.8	„	Influences on electrolytic actions.

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[4]) It must be emphasised as a fundamental of the decimal principle, that any number is a subdivision of that same number with the right-hand digit removed. Thus 62 is a subdivision of 6. In practice the first decimal point is omitted.

[5]) Electrochemistry has relations with various sciences and industries as has perhaps no other subject. Its existence as a science is the result of such relations. Therefore no number where all of its interests can be efficiently grouped together, can be assigned to it. Most of the branches of electrochemistry are covered by the four great divisions mentioned.

If later it were necessary to distinguish between the various influences, then:

54 117.444.81 could mean Influences of temperature
.82 „ „ „ „ current density
.83 „ „ „ „ additional solvents

As is evident from this example, no subject can outgrow the decimal system.

The ease with which an article treating of the relationships between two subjects can be dealt is shown by the following example. An article appears on "Thermochemistry of Electrolytic Dissociation". Thus under 54 "chemistry", the symbol for "thermochemistry" is **116**; the symbol for "electrolytic dissociation" is **117.33**; the colon is used to separate the symbols for the two subjects.[6]) The symbol for the above article may read **117.33 : 116** or **116 : 117.33**. In the first case the card will be classified under "electrolytic dissociation", in the second under "thermochemistry". Thus students of either subject may readily find the articles of interest to them.

The Relative Decimal System permits of other advantageous arrangements. One is a classification according to special forms of documents by means of the double zero within parenthesis. Thus **(002)** means "price-lists" and **(008)** means "patents". A price-list of electrically refined metals would be found under **(002)857** among the cards on "metallurgy", **669**; and a patent on an electric igniter under (008) **366.2** among the cards of **621**, "mechanical engineering".

It has been thought useful to classify certain references in regard to the general form of publication, etc., as when the reference refers to a "text-book" **(02)**, to a "periodical" **(05)**, or to teaching" **(07)**. All such classification is symbolized by a single zero with a parenthesis. A "periodical of electrical engineering" would be **(05)** under **621**.

Another classification is used to subdivide references geographically. The symbol is the simple parenthesis. So that **(494)** would be Switzerland, **(44)** France, **(73)** United States. Calcium carbide under **661** "manufacture of chemicals" is symbolized by **653.141** and "calcium carbide manufacture in Switzerland" would be **(494)653.141** or **653.141(494)**.

A further important convention is for expressing the "point of view" from which the article is studied. This is designated by the double zero without parenthesis. For instance **.003** means "costs", **.004** means "operation, maintenance", and **.006** means "plants, buildings". Thus **.766** under **669**, "metallurgy" meaning "aluminum", then **.766.006** symbolizes "a plant for aluminum manufacture".

The convention, the single zero without parenthesis, represents special analytic subdivisions. These vary with the various sciences. Thus for chemistry **.05** means, "quantitative analysis". **619.1** meaning "arsenic", **619.1.05** means "quantitative analysis for arsenic."

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6) When a relationship becomes of exceptional importance it may at any time be given a special number.

Where a subordinate classification other than the usual one is necessary the dash is employed in adding the subordinate symbols. For instance under "conductivity" it would not do to divide "conductivity of gases" decimally by chemical elements for later it may be necessary to consider various types of conductivity in gases. Therefore the chemical or subordinate classification is expressed by another symbol, the dash. Under **669** "metallurgy" **877.3** means „electroplating by material". The rational classification of this group is for the plating material. **877.321** is gold plating, 21 meaning gold. The subordinate classification would be by the substance plated and, 22 meaning silver, **.877.321—22** would mean plating of silver with gold.

With these conventions the code can serve numerous purposes; and properties, objects, or processes can alike be classified or found with facility.

The order of precedence of the symbols in arranging the cards is :, ( ), —, 00, 0, 1, 2 etc. This is illustrated by the following:

.12.9
.13 :;622
.13 (008)
.13 (02)
.13 (44)
.13—2
.13.003
.13.018
.13.11
.13.24

Main Divisions

of the

Dewey Relative Decimal Classificaton.

.0 General Works.
.1 Philosophy.
.2 Religion.
.3 Sociology.
.4 Philology.
.5 Natural Science.
.6 Useful Arts.
.7 Fine Arts.
.8 Literature.
.9 History.

.5 Natural Science.	.6 Useful Arts.
.51 MATHEMATICS.	.61 MEDECINE.
.52 ASTRONOMY.	.62 ENGINEERING.
.53 PHYSICS.	.63 AGRICULTURE.
.54 CHEMISTRY.	.64 DOMESTIC ECONOMY.
.55 GEOLOGY.	.65 COMMUNICATION.COMMERCE.
.56 PALEONTOLOGY.	.66 CHEMICAL TECHNOLOGY.
.57 BIOLOGY.	.67 MANUFACTURES.
.58 BOTANY.	.68 MECHANIC TRADES.
.59 ZOOLOGY.	.69 BUILDING.

53 PHYSICS.

53 1 Mechanics.
2 Liquids. Hydraulics.
3 Gases. Pneumatics.
4 Sound. Accoustics.
5 Light. Optics.
6 Heat.
7 Electricity.
8 Magnetism.
9 Molecular physics.

54 CHEMISTRY.

54 1 Theoretical chemistry.
2 Practical and experimental chemistry.
3 Analysis.
4 Qualitative analysis.
5 Quantitative analysis.
6 Inorganic chemistry.
7 Organic chemistry.
8 Crystallography.
9 Mineralogy.

62 ENGINEERING.

621 Mechanical engineering.
622 Mining „
623 Military „
624 Bridge & roof „
625 Road & railroad „
626 Canal „
627 River & harbor „
628 Water-works. Sanitary engineering.
629 Other branches of engineering.

66 CHEMICAL TECHNOLOGY.

661 Technology of chemicals.
662 Pyrotechnics. Explosives.
663 Beverages. Wines. Etc.
664 Foods. Sugar. Starch. Etc.
665 Lights. Gas. Oil. Candles.
666 Ceramics. Glass. Clay. Cement.
667 Bleaching. Dyeing. Inks.
668 Other organic chemical industries.
669 Metallurgy. Assaying.

The Code of Classification

used for

Electrochemistry

and

Allied Subjects.

53 PHYSICS

5 Light. Optics.

52 Propagation and Velocity of Light.

525 Corpuscular radiations. Radioactivity.

(See also [54] 115 Radiochemistry.)

Ultra-gaseous states. Radiant material. 1)

.1 Theories of corpuscular radiations and radioactivity

.2 Laws of corpuscular radiations

Density law

.3 Production of the rays. Causes

Physical and chemical actions on —

.31 Natural sources

.315 Radioactive chemicals. General considerations

.2 Disintegration of elements. Emanation

.316 Radioactive inorganic chemicals

.242 Radiotellurium (for present see polonium)

.432 Radium

.2 Radium emanation

.7 Uranium. Uranium emanation

.841 Thorium. Thorium X. Emanation

.842 Actinium (= Emanium)

.87 Polonium.

.319 Various natural sources

Waterfalls. Atmosphere

.33 Physical causes and sources

.34 Chemical causes and sources

.4 Properties and effects of the radiations

.41 General

---

1) In contradistinction to vibratory etheric radiations.

53 PHYSICS (continued)

525.43 Physical properties and effects. (Subdivide as [53])
.435.2 Velocity of radiations
.31 Reflection and refraction of the radiations
.34 Penetration of the radiations
.37 Fluorescent properties and effects
.437 Electric properties and effects
.2 Electrostatic deflection
.438 Magnetic properties and effects
Magnetic deflection
.44 Chemical properties and effects (Subdivide as [54])
Radioactive transformations. Radioactive equilibrium
Photographic action. Ionization
.46 Special properties and effects
.462 Emanating power. Emanation. Diffusion
Degree of radioactivity. Intensity
.463 Growth and decay of radioactivity. Permanence
.464 Transmitted radioactivity
Concentration of transmitted radioactivity
.47 Biological properties and effects
.5 Measurements of radioactivity
.52 Qualitative methods
.523 Fluorescent methods
.524 Electric methods
.525 Photographic methods
.56 Constants. Radioactivity constants
.6 Rays. Radiations
.61 General
.62 Refractable, reflectible rays. Cathode rays
.63 Non-refractable rays. General. X-rays
.64 Non-refractable, magnetically deflectable rays. β-rays
.65 Non-refractable, non-magnetically deflectable rays
.652 Negative rays. γ-rays
.656 Positive rays. α-rays.
.7 Special apparatus for study of radioactivity
Spinthariscopes. Focus-tubes. Special electroscopes. Ray filters.
Emanation condensation apparatus. Transformation apparatus
.9 Applications of corpuscular radiations and radioactivity

54 CHEMISTRY.

1 Theoretical Chemistry.

11 Physical Chemistry.

111 Physical chemistry. General
.1 Theory and nature of phenomena
.2 Terminology. Laws
.22 Nomenclature. Terminology
Definitions. Symbols. Units
.23 Laws

54 CHEMISTRY (continued)

111.232 Hypotheses
.233 Mathematical deductions
.234 Relationships. Proportions
.235 Empirical laws and formulae
.236 Formulae. General. (Chem. form. see 19.) Constants of formulae
.238 Exceptions
.24 Calculations
.3 Causes and production of phenomena
.33 Physical causes (Subd. as [53])
.34 Chemical causes (Subd. as [54])
.38 Influences on the production of the phenomenon
.389 Influences of impurities
.4 Properties, actions and effects of the phenomenon or material
.43 Physical properties and effects (Subd. as [53])
.44 Chemical properties and effects (Subd. as [54])
.47 Biological properties and effects
.48 Influences on the actions or effects of the phenomenon
.49 Secondary reactions and effects
.5 Measurements. Methods. Procedure. Instruments. Data
.52 Qualitative or relative measurements
.521 General
.523 Physical methods
.1 Mechanical methods
.4 Sonorous „
.5 Luminous „
.6 Thermal „
.7 Electric „
.8 Magnetic „
.9 Molecular „
.524 Chemical methods
.1 Physico-chemical methods
.16 Thermochemical methods
.17 Electrochemical methods
.4 Chemic-analytic methods
.6 With special inorganic substances
.7 „ „ organic „
.527 Biological methods
.54 Quantitative or absolute methods (Subd. as 111.52)
.56 Measurements of types of the phenomenon
(Special subd. for each phenomenon)
.57 Instruments
.578 Calibration and constancy of instruments
.58 Procedure
.588 Influences affecting observation and registration of the phenomenon

.1 Mechanical .4 Chemical .7 Electric
.2 Liquid .5 Luminous .8 Magnetic
.3 Gaseous .6 Thermal

54 CHEMISTRY (continued).

111.59 Tabulated Data. Graphics

112 Liquids

.1 Theory of liquids and of liquid phenomena
Composition, structure of liquids

.2 Laws of liquids

.3 Causes of phenomena in liquids

.33 Physical properties and causes (subd. as [.53])

.34 Chemical properties and causes (subd. as 54)

.4 Properties, actions and effects of liquids

.43 Physical properties and effects of liquids

.436 Melting-point and boiling-point lowering

113 Gases

114 Solution

.1 General

.2 Osmose (cause). Diffusion (effect)

.21 General

.22 Osmose. Osmotic pressure. Endosmosis. Exosmosis. Plasmolysis

.224 Properties and effects of osmotic pressure

.25 Diffusion (see also 18)
Slow diffusion. Amorphous. In colloids.
Rapid diffusion. Crystalline. In crystalloids

.3 Dissolving and solution. General[2])

.31 Theories of solution.
Kinetic theory of solution. Hydrate theory. Dissociation theory

.32 Terminology. Laws of solution. Solution laws of van't Hoff, etc.

.332 Solution pressure Tension series

.4 Dissolving and solution of gases

.41 Dissolving of gas (standpoint of solute)

.42 Dissolving of gas in gas

.43 „ „ in liquid

.44 „ „ in solid

.45 Solution of gas (standpoint of solvent)

.46 Solution „ in gas

.47 „ of liquid in „

.48 „ of solid in „

.5 Dissolving and solution of liquids (subdiv. as 114.4)

.6 „ „ „ of solids (subdiv. as 114.4)

.7 Properties of solutions

(Each property to receive affixes with dash '—' for the chemicals entering into consideration.)

—2 By solutes

—3 Inorganic solutes

—32 „ „ inorganic solvents (subd. for solutes as 6)

—36 „ „ organic solvents „ „ as 6)

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[2]) Solubility is here considered actively as a phenomenon. "Solution" is used as the act of absorbing. "Dissolving" is used as the act of being absorbed.

54 CHEMISTRY (continued)

114.7 —4 Organic solutes
—42 " " inorganic solvents (subd. for solutes as 7)
—46 " " organic solvents " " as 7)
—5 By solvents
—6 Water as solvent
—62 " " " Inorganic solutes
—66 " " " Organic "
—7 Inorganic solvents
—72 " " Inorganic solutes (subd. for solvents as 6)
—76 " " Organic " " " as 6)
—8 Organic solvents
—82 " " Inorganic " " " as 7)
—86 " " Organic " " " as 7)
.71 Density. Specific gravity etc. of solutions
.72 Pressures. Vapor pressures. Partial pressures
.724 Viscosity
.73 Chemical affinity (Subd. as 13)
.74 Dissociation of solutions. General
.744 Hydrolytic dissociation. By solution
.745 Luminous dissociation of solutions
.746 Thermal " " "
.747 Electric, Electrolytic dissociation of solutions (See also 117.3)
.77 Electric properties of solutions
.8 Special solutions (Subd. decimally as shown with dash under 114.7) (See also 18 Solubility)
.89 Solution types
.891 Colloidal solutions. Emulsions. Positive and negative colloids
.892 Gelatinous solutions
.898 Suspensions

115 Photochemistry. Radiochemistry
(See also [53]525, Corpuscular radiations)

116 Thermochemistry
Energy transformations. Free energy. Bound energy. Heat-tone. Endothermic and exothermic reactions. Reaction heats. Formation heats. Neutralization heats. Thermoneutrality. Combustion heats. Dissociation and ionization heats. Temperatures. Reaction temperatures. Temperatures of reduction and oxydation.

117 Electrochemistry
.1 General
.11 Theory of chemic-electric energy transformation
.12 Terminology, Units and Laws of electrochemistry
.122 Terminology. Units. Electrostatic and electromagnetic units
.123 Laws of electrochemistry
Laws of Gibbs, Braun, von Helmholtz, Coulomb
.15 Electrochemical measurements. General
.2 Propagation and transmission of electricity (see also [621].315)
(See also 117.72, Transmission in gases)

54 CHEMISTRY (continued)

117.22 Resistivity. Ohm's law
.221 Theory of resistivity
.222 Terminology, Units and Laws of resistivity
.3 Laws. Ohm's law
.223 Production and causes of resistivity
.3 Physical causes
.36 Thermal causes
.4 Chemical causes
.224 Actions and effects of resistivity
.225 Measurement of resistivity. Methods, Instruments, Procedure
.227 Apparatus for resistivity study
(Apparatus for measurement under 117.225.)
.23 Conductors of two or three dimensions. Resistance
(See also [621].315.5.)
Copper, iron, aluminum and sodium conductors.
.232 Laws of current transmission in conductors of two or three dimensions. Formulae
.238 Varia
.2 Resistivity of special substances of the first class
.3 " " " " " " second class
(see also 117.42)
(Subd. 06 as 6; 07 as 7)
.239 Applications of resistivity
Hot-wire and platinum resistance thermometers
.24 Resistors and Dielectrics
.241 Resistors
.244 Compound resistors. Mixtures
.245 Dielectrics. (See also [621].315.6)
.248 Compound dielectrics. Mixtures
.25 Transmission in multiple and complex circuits.
.26 Electrothermal transformations. General
.27 Electrothermics. Production of heat by the current
.272 Laws of electrothermics. Joule's law
.278 Varia
.7 Peltier effect
.28 Thermoelectricity. Electricity from heat
.288 Varia of thermoelectricity
.2 Specific thermoelectromotive forces of couples
.5 Thermoelectric cells and piles
59 Uses of thermoelectric cells
.7 Thomson effect
.3 Ionization, Dissociation
(see also 114.747 for solutions; 117.723 for gases)
.31 General (Disintegration of elements see [53] 525.315.2)
.32 Ionization BY— (Causes). Dissociating power
.33 Dissociation OF— (Effects)
.333.8 Influences on dissociation
Of solvent; of temperature; of light; etc.

54 CHEMISTRY (continued)

117.36 Ions. Corpuscles. Electrons. Ionands. Anions. Cathions
(From chemical standpoint see 12)
.364 Properties and effects of ions etc.
.3 Physical properties and effects
Absolute and relative migration velocities. Charges.
.4 Chemical properties and effects
Composition. Structure. Magnitude
.37 Ionic transmission of electricity. 1)
(From standpoint of ions; for electric standpoint see electrolysis)
.371 Theories of ionic transmission. Hittorf's theory.
.372 Laws of ionic transmission
.373 Production and causes of ionic transmission
.8 Influences affecting ionic transmission. Ionic friction
.378 Varia of ionic transmission
.2 Transference numbers
.8 Dissociants
.4 Electrolysis and Polarization
.42 Conductivity (Studied as phenomenon) (See also 117.22 Resistivity)
.422 Laws of conductivity. Dilution laws of Ostwald, Rudolphi, etc.
.423 Production and causes of conductivity
.8 Influences on conductivity. Of pressure, dilution, temperature
.425 Measurement of conductivity and conductance
Methods. Procedure. Instruments
.2 Qualitative methods
.4 Quantitative methods
Constant, induced and alternating-current methods
.7 Instruments for conductivity measurements.
Conductivity vessels
.78 Calibration and constancy of instruments
.8 Procedure for measurement of conductivity. Standard solutions
Temperature control. Preparation and dilution of solutions
.88 Influences affecting measurement
.427 Apparatus for study of conductivity
.428 Varia of conductivity
.2 Conductivity of matter in different states
.22 In liquid states
.23 In solution states
.28 In fused states
.4 Types of conductivity
(By causes (acting on); by effects (produced by))
Molecular conductivities. Equivalent conductivities
" " at infinite dilution
Isohydric "
.43 With flowing electrolyte
.44 With rotating electrode

---

1) Here ions electrons, and corpuscles are studied together.

54 CHEMISTRY (continued)

117.43 Conductivity of special liquids and solutions
(Studied as a property)
.431 Conductivities of liquids
.432 Conductivities of special solutions. General
Of colloidal and gelatinous solutions. Of fused solutions.
.433 Conductivities of aqueous solutions
.434 Conductivities of solutions with inorganic solvents
(Subd. decimally as 6 for solvent)
(Subd. with 06 as 6; with 07 as 7 for solutes)
.435 Conductivities of solutions with organic solvents
(Subd. decimally as 7 for solvent)
(Subd. with 06 as 6; with 07 as 7 for solutes)
.436 Conductivities of solutions with inorganic solutes
(Subd. decimally for solutes as 6)
.437 Conductivities of solutions with organic solutes
(Subd. decimally for solutes as 7)
.438 Conductivities of fused substances
.439 Other conductivities
.1 Of gases (see also 117.7 Electrochemical phenomena in gases)
.2 Of mixed solutions
.44 Electrolysis. Electrolytes. (Here studied as a phenomenon.)
(For electrolysis as a method of production see 283)
.441 Theory of electrolysis
.442 Laws of electrolysis
.443 Production and causes of electrolysis
.8 Influences on production of electrolysis
.444 Actions and effects of electrolysis
.3 Physical properties and effects
.4 Chemical „ „ „
Ions reacting with solvent, electrolyte, electrode
„ decomposing to form new products
.43 Corrosion
.8 Influences on actions or effects of electrolysis
Influences of current-density, terperature, additional solvents
.9 Secondary actions or effects of electrolysis. Yield
.447 Apparatus for study of electrolysis
.448 Varia of electrolysis
.2 Electrolysis in different states of matter
.22 „ in liquid states of matter
.23 „ in solution states of matter
.28 „ in fused states of matter
.4 Types of electrolysis
.42 By causes
.45 „ „ Various types
.451 A. C. electrolysis (see also [661].113.765)
.452 Radioactive electrolysis
.453 Indirect electrolysis

54 CHEMISTRY (continued)

117.448.46 By effects
.47 Electroplating
.49 By effects. Various types
.491 Cataphoresis. Mechanic-electric transmission of particles
Metal clouds
492 Contra electrolysis
.8 Electrolytes. Anolytes. Catholytes
Abnormal electrolytes. Fused electrolytes
.45 Decomposition values or voltages. (Studied as a phenomenon)
.451 Theory of decomposition values
.452 Laws of decomposition values
.453 Causes of decomposition values
.8 Influences on decomposition values
.454 Influences and effects of decomposition values
.455 Measurement of decomposition values
Methods. Procedure, Instruments
.457 Apparatus for study of decomposition values
.458 Varia concerning decomposition values
.7 Electrode phenomena. Overvoltage. Deionizing
.46 Decomposition values studied as a property
(Subd. .6 as 6; .7 as 7)
.47 Polarization. Depolarizing
.473 Production and causes of polarization
Polarization by solids (Resistance)
Polarization by liquids. (Exhaustion)
Polarization by gases. (Insulation) Occlusions
.474 Effects of polarization. Counter electromotive force
.478 Varia of polarization
Passivity. Self-polarization, Electrocapillary phenemena
.8 Depolarizers
Gaseous, liquid, solid, and mechanical depolarizers
.5 Chemicelectromotive force
.51 Theories of chemicelectromotive force
Contact and chemical theories
.52 Laws and calculation of chemicelectromotive force and P. D.
.53 Causes and production of chemicelectromotive force
.533 Physical causes of chemicelectromotive force
.1 Non-chemical E. M. F. and P. D. from solids
Concentation elements with soluble and insoluble salts of the metal. Transformation elements.
.2 "Liquid elements"
Osmotic pressure effects. Solution pressure effects
.3 Non-chemical E. M. F. and P. D. from gases
.534 Chemical production of chemicelectromotive force
Chemical cells (See also 117.6). (Here only studied where POTENTIAL DIFFERENCE OR ELECTROMOTIVE FORCE receives primary or novel treatment.)

54 CHEMISTRY (continued)

117.534.2 Chemical elements (electrical). General
.3 Oxidation and reduction elements. Separated elements
.5 Gas elements (electrical)
.538 Influences on production of E. M. F.
.54 Effects of E. M. F. and P. D.
.55 Measurements of E. M. F. and P. D.
.552 General relative methods
.554 „ absolute methods
.556 Measurements of types of E. M. F. and P. D.
.2 Measurements of single potential differences
Absolute and relative measurements
.557 Instruments. Calomel electrodes. Standard cells
.558 Procedure in E. M. F. measurements
.8 Influences affecting observation and registration of E. M. F.
.559 Tabulated data. Mathematical and empirical
P. D. — concentration tables
Between metals and their salts
The tension series
.57 Apparatus for study of chemicelectromotive force
.6 Chemicelectricity. Cells and accumulators
.61 Cells and accumulators. General
.62 Cells. General (see also [621].352.)
Chemical work. Capacity. Internal resistance.
.63 Constant cells. Double liquid cells
.632 Reversible types. Standard cells.
.2 Halogen acid cells
.3 Nitrate cells
.4 Sulphate cells. Standard cells. (See also [621].354.3)
Daniell, Clark and Weston types
.5 Phosphate and arsenate cells
.6 Chromic acid cells
.7 Acetate and cyanide cells
.8 Other types of constant cells.
Amalgam cells. Oxygen cells
.9 Unique forms of constant cells.
Gravity cells. Plunging cells.
.635 Non-reversible types. Grove and Bunsen cells
.64 Inconstant cells
.642 LeClanche types (Electrode depolarizers)
MnO_2 and PbO_2 depolarizers
.643 Bichromate cells. Grenet cells. Smee cells
.645 Gas cells. Pressure types etc.
.646 Polarization types. Aluminum Cells. Wehnelt interrupters
.647 Dry cells. Voltaic piles
.648 Combustion types. Ostwald cell. Borchers cell
.65 Accumulators (See also [621].355)
.651 Theory and nature of accumulators. Theory of the charge

54 CHEMISTRY (continued)

117 652 Laws of accumulator action
.653 Causes and production of accumulator action
.8 Influences affecting accumulator action
.654 Properties and action of accumulators
.3 Physical properties
.37 Electrical properties. Capacity
.9 Secondary actions in accumulators
.655 Measurements
.658 Varia of accumulators
.66 Types of accumulators (Subd. as [621].355)
.68 Photoelectric phenomena
Luminous effects on electricity. Selenium cells. Electrical actinometers. Hallwach's effect. Tiring of electrode surfaces. Electric rotation of plane of polarized light
.7 Electrochemical phenomena in gases
(See also 117.439.1 Conductivity of gases)
.72 Discharge through gases and vapors. General
(Includes arcing in liquids)
.721 Theory. Nomenclature, etc. of discharge through gases
.722 Laws of discharge and transmission through gases
.723 Ionization. Electrification. Ions
.1 Theory of ionization
.2 Laws of ionization
.3 Production of ionization by emanation, by electric stress, by heat
.4 Effects of ionization
.42 Ions. Corpuscles. Ion charges, masses and volumes. Radiant ions
.8 Influences on discharge through gases
.852.5 Radioactive influences
.88 Magnetic influences
.724 Properties and effects of discharge through gases
.3 Physical properties and effects of discharges
.31 Puncturing and penetration of material. Rapidity and duration of discharges
.37 Electric character of discharge
.4 Chemical properties and effects of discharges. Chemical decomposition. Polar (see also electrolysis). Indirect or nonpolar (i. e. same product at both electrodes; thermal action of the current)
.6 Various effects on discharge through gases
.61 Saturation currents
.725 Measurement of discharge through gases
.4 Chemical methods
.5 Radiation methods
.7 Electrical "
.727 Apparatus, general and accessory for discharge through gases
.728 Discharge through gases. Varia

54 CHEMISTRY (continued)

117.73 Electric vacuum phenomena. Electric phenomena in rarified gases
.731 Theory, etc. Of Geissler tubes, etc.
.736 Special considerations
.1 Electrodeless discharge
.74 Types of discharge through gases
.742 Silent discharge. Dissipation of charges
.743 Glow discharges. St. Elmo's fire (No coloring of discharge path except at electrode)
.744 Brush discharge (Discharge path colored)
(See also vacuum discharge phenomena)
.745 Spark discharge (Brillant white discharge)
.746 Disruptive discharge. (Constant spark)
.747 Flame discharge. The electric arc. (Constant heavy spark discharge)
.4 Actions and effects of the electric arc
.44 Chemical actions and effects. Electrode effects
.49 Applications of the arc. Arc spectra
.75 Discharge into gases. Of ions or corpuscles from bodies
.76 Electrochemical phenomena in special gases
(Subd. .6 as 6; .7 as 7)
.77 Electrochemical phenomena in the atmosphere
Air electrification
.8 Various electrochemical considerations
.81 Pyro- and piezo-electricity
.811 Pyro-electricity
.8 Pyro-electric constants
.812 Piezo-electricity
.8 Piezo-electric constants

118 Magnetochemistry

119 Physical chemistry of solids
Melting-points

12 Atomic theory. Composition

Chemical equivalents. Atoms. Molecules. Atomic weight. Molecular weight. Atomic and molecular volume. Ions. Ionands.

13 Chemical affinity. Chemical activity

131 General
Effects of composition and constitution on chemical action. Measurement of chemical activity

132 Mass action

133 Chemical dynamics. Chemical reactions
Temperatures of reaction. Neutralization heats. Reaction velocity. Homogeneous reactions. Mono-, bi- and tri- molecular reactions. Catalysis. Catalyzers. Poisoners. (Catalytic processes see 289.1) Hydrolysis. Side and counter reactions. Heterogeneous reactions

134 Chemical equilibrium

135 Phase rule. Critical points
Transformation temperatures and velocities.

54 CHEMISTRY (continued)

136 **Equilibrium in solutions.** (See also 114 Solution)

138 **Combustion. Thermal dissociation.** (See also 29 Oxidation)

14 Salts. Acids. Bases.

Hydrates. Anhydrides. Alloys. Oxides

Origin. Source. Acidity. Basicity

15 Types

Molecular types. Varieties. Valencies

16 Compound radicles

Theoretical chemical structure. Stereochemistry

17 Allotropy. Isomerism. Tautomerism. Polymerism

18 Solubility. Water of crystallization Degrees of solubility

(See also 114 Solution)

(The condition, property or state of solution goes here)

19 Classification. Periodic law. Nomenclature. Notation. Formulae. Stoichiometry

2 Practical and Experimental Chemistry

21 Laboratory

22 Apparatus and manipulation. General

Accessory material. Preparation of material

Pulverizing. Trituration. Sifting. Mortars. Pestles. Vessels. Supports. Bottles. Tubing. Etc.

221 **Manipulations. Arrangements**

23 Weighing and Measuring. Specific gravity

Ballances. Pyknometers. Aerometers

24 Heating. Baths. Distillation

245 **Indirect heating**

.7 **Electric heating**

Electric radiators and stoves

(See also 282 Electrothermic apparatus and manipulation)

25 Blowpiping

26 Aqueous treatment. Solution. Precipitation

Dialysis. Concentration. Dilution

27 Gas manipulation

(See also 57 Eudiometry)

28 Electric apparatus and manipulation

281 **General**

Yield. Current efficiency. Sources of current loss

Secondary reactions. Capacity of apparatus

282 **Electrothermic apparatus and manipulation**

(See also 245.7 Electric heating)

283 **Electrolysis. Electric synthesis. General**

.3 Special-properties of apparatus and process

.4 Types of apparatus and process.

.4 Classification by character of apparatus

54 CHEMISTRY (continued)

283.422 Diaphragm processes
.423 Non-diaphragm processes
.43 Classification by nature and function of solution
.432 With aqueous solutions
.433 „ non-aqueous solutions
.436 „ fused electrolyte
.438 Varia
.1 Gravity processes
.44 Classification by electrode function
.442 With soluble anode
.443 „ insoluble anode
.45 Classification by character of electricity
.46 Classification by voltage types
.462 Constant voltage types
.463 High voltage types
.466 Depolarization types
.467 Polarization types
.47 Classification by current types
.472 Constant current types
.473 Heavy current types
.474 Interrupted current types
.48 Various
.481 Mercury transmission types
.5 Reactions
.7 Apparatus. Component and accessory —
(Subd. in general as [621].351.7)
.71 Vessels. Receivers. Vats. Troughs.
Jars. Lids. Stoppers and seals. Taps and vents.
Linings and casings. Hand-grips
.72 Electrodes and attachments
Grids. Pastes. Chemicals. Binders
Supporting-frames. Insulators. Racks
.4 Electrode Types — Plate, Disc, Spiral, Netting, Platinum, Parasitic, Revolvable, Series, Multiple, Compound. Filter
.73 Diaphragms. Membranes. Partitions. Sacks. Porous cells
.74 Special electrolytes. Depolarizers
.75 Connections. Binding-posts. Terminals. Clamps.
.76 Circulators. Conduits. Piping. Feeders
.77 Regulators
Of supply, discharge, current and temperature
.78 Special measuring instruments
.79 Other apparatus. Scoops, Collecters, Sieves.
.8 Varia. Polarity testing. Polarity paper
.9 Electric synthesis. General (Specific types of synthesis are to form subgroups of the electrolytic processes)

284 Electrolysis with fusion

285 Electrolysis of solutions

54 CHEMISTRY (continued).

286 Various electrolytic processes and apparatus
- .1 Autoelectrolytic processes. Internal electrolytic processes
- .2 Indirect and secondary electrolytic processes
- .3 Colloidal processes
- .5 Alternating current electrolytic processes
- .8 Electroplating processes (See also [669].877)

287 Spark and brush discharge apparatus and manipulation
- .2 Spark discharge processes
- .5 Brush „ „

288 Accessory apparatus (non-electric)

289 Other electric processes
- .1 Catalytic processes (Catalysis see 133)

29 Other chemical Operations

Oxydations. Reductions. Agents

294 Separations
- .2 Precipitation of a chemical from mixtures
- .3 Separation of elements from compounds

Electric separations (See 28, 497 and 53)

295 Impurities. Purification

296 Impurities

297 Purification
- .18 Sterilization
- .5 Chemical purification
- .6 Thermal „
- .7 Electrical „

3 Analysis [1])

(See also [669].881 and [661].118.1)

Analysis of Food, Milk, Water, Drugs, Rocks

4 Qualitative Analysis

Wet, Dry, Blowpipe, Gas, Dialysis, Spectrum, Polariscopic, and Microscopic analysis

49 Various methods

497 Electric methods

5 Quantative Analysis

Gravimetric, Wet, Electrolytic, Dry, Volumetric, Solution, Gas (Eudiometry), and Colorimetric analysis

53 Electric methods of quantitative analysis

Constant potential and constant current methods

59 Synthesis

597 Electric synthesis

(For electric syntheses of special substances see 283.9)

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[1]) Use this number for all general considerations of analysis

54 CHEMISTRY (continued)

6 Inorganic Chemistry

Each element, in the subdivision reserved for the element itself, is to be subdivided as follows:

.1 Solid forms of the element
.2 Crystalline forms of the element
.3 Amorphous forms of the element
.4 Colloidal form of the element
.5 Liquid forms of the element
.8 Gaseous forms of the element
.91 Disintegrations from the element

Affixes of Symbols for Inorganic Compounds [1])

.113 Hydrides
.115 Hydroxides. Hydrates
.122 Halogen compounds
.132 Chlorine compounds
.133 Chlorides
.134 Chlorites. Hypochlorites Oxychlorides
.135 Chlorates
.136 Perchlorates
.142 Bromine compounds
.143 Bromides
.145 Bromates
.152 Iodine compounds
.153 Iodides
.155 Iodates
.161.2 Fluorine compounds
.3 Fluorides
5 Fluorates
.172 Nitrogen compounds
.173 Nitrides
.174 Nitrites
.175 Nitrates
.182 Phosphorus compounds
.183 Phosphides
.184 Phosphites. Hypophosphites
.185 Phosphates
.186 Hypophosphates Pyrophosphates
.191 2 Arsenic compounds
.3 Arsenides
.4 Arsenites. Hydroarsenites
.5 Arsenates
.212 Oxygen compounds
.213 Oxides
.222 Sulphur compounds
.223 Sulphides. Hydrosulphides
.224 Sulphites. Hyposulphites
.225 Sulphates
.226.1 Persulphates
.228 Complex sulphur compounds (e. g. SCl compounds)
.233 Selenides
.235 Selenates
.241.5 Tellurates
.262 Carbon compounds
.263 Carbides
.265 Carbonates
.266.1 Percarbonates
.2 Bicarbonates
.272 Boron compounds
.273 Borides
.275 Borates
.281.2 Silicon compounds
3 Silicides
.5 Silicates
.392. Ammonium compounds
.515 Plumbates
.662 Aluminum compounds
.665 Aluminates
.668.2 Alums
.3 Ultramarines
.715 Manganates
716.1 Permanganates
.725 Ferrates
.765 Chromates
.766.1 Bichromates
.2 Trichromates
.768.2 Chrome alums
.775 Molybdates
.785 Tungstates
.791.5 Uranates
.815 Stannates
.855 Vanadates
.865 Antimonates
.925 Platinates
.97 Organic salts
.971.3 Cyanides
.5 Cyanates

(Complex compounds are classed under the most important of its components.)

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1) Chemical compounds are expressed by prefixing the number under 6 that symbolizes the metallic element, to the following list of affixes.

54 CHEMISTRY (continued)

61 Metalloids Non-metals
611 Hydrogen
.51 Water. Steam
612 Halogen group
613 Chlorine
614 Bromine
615 Iodine
616.1 Fluorine
617/19 Nitrogen group
617 Nitrogen
618 Phosphorus
619.1 Arsenic
62 Oxygen group
621 Oxygen
622 Sulphur
623 Selenium
624.1 Tellurium
.2 Radiotellurium
625 Carbon group
626 Carbon
627 Boron
628.1 Silicon
629 Helium group
.1 Helium
.2 Neon
.3 Argon
.4 Krypton
.5 Xenon
63 The Metals
631 Alkali metal group
632 Potassium
633 Sodium
634 Lithium
635 Rubidium
636 Caesium
639 Ammonia. Ammonium
64 Alkaline earth metal group
641 Calcium
642 Strontium
643.1 Barium
.2 Radium
644 Magnesium group
645 Beryllium (Glucinum)
646 Magnesium
647 Zinc
648 Cadmium
65 Lead group
651 Lead
652 Thallium
655 Silver group
656 Copper
657 Silver
658 Mercury
66 Cerium group
661 Yttrium
662 Cerium
663 Lanthanum
664 (Didymium)
.1 Praseodym
.2 Neodym
665 (Erbium)
.1 Ytterbium
.2 Terbium
666 Aluminum
667 Indium
668 Gallium
669 Other rare earth metals
.1 Scandium
.2 Samarium
.3 Decipium
.4 Gadolinium
.5 Germanium
67 Iron group
671 Manganese
672 Iron
673 Cobalt
674.1 Nickel
675 Chromium group
676 Chromium
677 Molybdenum
678 Tungsten
679.1 Uranium
68 Tin group
681 Tin
682 Titanium
683 Zirconium
684.1 Thorium
.2 Actinium
685/89 Vanadium group
685 Vanadium
686 Antimony
687 Bismuth
688 Tantalum
689.1 Niobium
.2 Polonium
69 Platinum group
691 Gold
692 Platinum
693 Iridium
694.1 Osmium
695 Ruthenium group
696 Ruthenium
697 Rhodium
698 Palladium

54 CHEMISTRY (continued)

7 Organic Chemistry

71 Cyanogen and its compounds

718 Cyanides

715 Cyanates

72 Hydrocarbons. Fatty series

721 Paraffins

722 Olefines

723 Acetylenes

724 Valylene. Dipropargyl, Etc.

725 Hydrocarbons Aromatic series

726 Benzines

727 Diphenyl group

728 Naphthalene. Anthracene. Phenanthrene

729 Higher series

73 Alcohols. Phenols 1)

74 Ethers. Simple. Compound. Haloid

75 Aldehydes

76 Ketones. Quinones

77 Acids. Acid halides. Acid anhydrides. Sulpho-acids

78 Nitro-derivatives. Amines. Compound ammoniums. Amids. Amic acids Azo-bodies Azoxy-bodies. Hydrazo-bodies. Diazo-bodies

79 Compounds with metals

8 Crystallography

9 Mineralogy

54.0 Special Analytic Subdivisions for Chemistry

(The special affixes for chemistry are formed by prefixing a zero to the main subdivisions. Thus 'A method for qualitative analysis of gold' would be **691.04** or **4.0691**, depending on whether the reference was to be classified under gold or qualitative analysis)

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1) The seven heads 73 to 79 are subdivided like 72.

62 ENGINEERING

621 Mechanical Engineering

621.3 Electrical Engineering

621.03 Special Analytic Subdivisions for Electrical Engineering

(The special affixes for electrical engineering are formed by prefixing .03 to the main subdivisions. Thus "A continuously operated arc furnace" would be **365.52**.0365.632 or **365.632**.0365.52 (depending on whether the primary consideration was "arc furnace" or "continuous furnace".)

.31 Production and transformation of electricity

.311 Production. Central stations

.312 Generators. Dynamos

.1 Direct current generators

.12 Low voltage dynamos

.127 Low voltage dynamos. Heavy current types. Electrochemical types

.313 Motors

.314 Transformers. Converters. Induction coils

.6 Static converters

.62 Liquid converters. Aluminum cells (See also .372.242 and .353.44)

.63 Gaseous converters. Rectifiers. Mercury vapor tubes. Use (For manufacture see also .327.328).

.8 Condensers

.87 Electrolytic condensers

.315 Transmission of electricity (See also [54] 117.2)

.2 Underground transmission

.27 Influences affecting underground transmission

Electrolysis due to " "

(See also .332.6)

.5 Conductors. Copper; iron; aluminum: sodium. Special greases, etc (See also [54] 117.23)

.6 Insulators. Dielectrics

Insulators for conductors. Insulators for support

Dielectric material. Insulation compounds

(See also 372.22 and [54] 117.245)

Properties of insulators

Dielectric constants. Electrostatic rigidity

.317 Electric instruments and meters. Manufacture and use

(See also 378.7. Electrochemical instruments and meters)

.1 General

.2 Resistance meters

Wheatstone bridges. Resistance boxes. Ohmmeters

.3 Potential meters. Voltage meters. Electrometers. Voltmeters

.4 Current meters. Intensity meters

Ammeters. Coulombmeters (see also 378.7); Ampere-hour meters

.5 Quantity meters. Power meters. Watt meters

.8 Types of meters

621 Mechanical Engineering (continued)

.317.82 Recording meters. Time recording meters
Recording electric thermometers
.823 Recording voltmeters
.83 Prepayment meters

.32 Electric Lighting, Electric Radiation

.325 Arc lamps
.8 Composite electrode arcs. Flaming arcs. Electrolytic arcs. Carbide, Bremer, Magnetite, Titanium oxide arcs

.326 Incandescent lamps
.1 Carbon filament lamps. Description. Elements. Manufacture
.19 Special carbon filament types
.192 Bulbs charged with gases
.4 Non-carbon filament lamps
.41 Metal filament lamps. Platinum, Osmium, Tantalum lamps
.5 Glowers of second class conductors
.52 Carbide filament lamps
.53 Oxide filament lamps. Nernst lamps. Glowers. Ballasts. Heaters. Apparatus for manufacture

.327 Other electric lamps
.3 Fluorescent lamps
.32 Mercury vapor lamps
(See also [54]117.7. Electrochemical phenomena in gases)
.328 Static converters. Hewett mercury converters
.4 Lamps for special radiations
Manufacture of vacuum tubes, Crookes tubes and Braun tubes
Hard tubes and soft tubes. Radiometers

.38 Electric traction

.332 Transmission of electricity
.6 Electrolytic action in the vicinity of tracks (See also .315.27)

.335 Electric locomotives. Electric automobiles
Motors. Trucks. Controllers. Accumulators. Charging stations. Battery testers. (See also .356.22, Transportable types of accumulators.)

.34 Transmission of Electric Force
Mechanical applications

.35 Chemicelectricity
(See also [54] 117.6)

.351 Primary and secondary cells. General
.3 Technical properties of cells
.31 Mechanical properties of cells. Weight
.32 Voltage properties of cells
.322 E. M. F. of cells
.323 C. E. M. F. of cells. Polarization
.33 Resistance of cells. Inner resistance
.34 Output properties of cells
.342 Capacity of cells
.343 Discharge rate of cells
.344 Duty, capability of cells

621 Mechanical Engineering (continued)

.351.348 Efficiency of cells
.35 Duration properties of cells
.352 Life of cells
.354 Crumbling of cells
.7 Constituent and accessory apparatus
.71 Vessels
Vats. Troughs. Jars. Lids. Stoppers and seals. Taps and vents. Linings and casings. Hand grips
.72 Electrodes and attachments
Grids. Grid-frames. Pastes. Chemicals. Binders
Complete electrodes. Electrode types. Rotatable and high-discharge types. Electrode manufacture. Apparatus for electrode manufacture. Moulds. Presses. Supporting frames. Insulating rods. Racks. Lifting mechanism
.73 Diaphragms and partitions
Sacks. Semi-permeable diaphragms. Membranes. Non-porous diaphragms. Porous cells
.74 Electrolytes. Depolarizers. Packing
.75 Connections. Terminals. Binding-posts. Clamps
.76 Circulators. Conduits and piping
Liquid and gas supply and discharge. Feeders
.77 Regulating apparatus
Of feed; of discharge of products and by-products; of current; of temperature. Special switches, rheostats and heaters
.78 Special measuring instruments
Hydrometers. Special voltmeters. Ampere-hour meters
.79 Other apparatus
Special generatois. Scoops, Sieves

.352 Primary cells. General and Standpoint of manufacture
(See also [54] 117.62)
.1 General (Subd. as .351)
.2 Non-depolarized cells
.3 Depolarized cells. General (See also .351.74)
.4 „ „ Solid depolarizers
.42 „ „ Oxide „
With manganese dioxide depolarizers. LeClanche cells
„ copper oxide depolarizers. Lalande and Chaperon cells
„ iron oxide „ Clamond or Gaiffe cells
.43 Depolarized cells. Carbon depolarizers
.48 „ „ Special solid „
.481 With depolarizers thermally formed during service
.5 Depolarized cells. Liquid depolarizers
.52 With bichromate depolarizers
.53 „ sulphate depolarizers
With copper sulphate. Daniell cells
.54 „ acid depolarizers
With nitric acid. Grove and Bunsen cells

621 Mechanical Engineering (continued)

.352.55 „ chloride and chlorate depolarizers
.6 Depolarized cells. Gaseous depolarizers
.62 With oxygen
.63 „ chlorine
.67 Depolarized cells. Mixed depolarizers. Grenet cells
.7 With other depolarizers. With mechanical depolarizers
.353 Primary cells. For mode of operation. Standpoint of handling
.2 Mechanically classified cells
.22 Light-weight types. Transportable types
.25 Movable electrode or electrolyte types
.3 Cells classified by nature and arrangement of electrolyte
.32 Dry cells
.34 Gravity cells
.35 Cells classified „ „ „ „ „ electrodes
.352 Batteries. Plunging batteries
.38 Gas cells
.4 Cells classified by voltage
.42 Constant voltage types. (See also .354.92)
.43 High voltage types
.435 Low voltage types
.44 Polarization types
Wehnelt interrupters. Electric valves
Aluminum cells. Electrolytic condensers
(See also .314 62; .372.242)
.45 Cells classified by nature of current
.46 Constant current types
.47 Heavy „ „
.48 Interrupted „ „
.6 Cells classified for other modes of operation
.61 Cells classified thermally
Combustion cells Fused electrolyte cells
.62 Regenerative types of cells
.68 Magnetically operated cells
.8 Care. Handling. Manipulation.
.88 Phenomena detrimental to cells. Creeping
.89 Residues. Exhausted solutions. Cleansing
Recovery and use of residues and solutions
(See also .353.62)
.354 Primary cells. Standpoint of applications
.3 For scientific purposes. Standard cells (See also [54] 117.632.4)
.8 Electrotherapeutic types
.9 Cells for other applications
.91 Cells for electroplating. Special types
.355 Accumulators. General and Standpoint of manufacture
(See also [54] 117.65)
.1 General. (Subd. as .351)

621 Mechanical Engineering (continued)

.355.2 Lead accumulators
.3 „ „ Naturally formed. Plante types
.4 „ „ Artificially formed. Faure types
.45 „ „ Combination types. Plante-Faure types
.48 „ „ Complex oxide plates
.49 Lead element accumulators
.492 Zinc-lead accumulators. d'Arsonval types
.493 Copper-lead „
.494 Cadmium-lead „
.5 Gas accumulators
.6 Alkaline accumulators
Edison. Cupron. Lalande types
.7 Other types of accumulators
Thallium „

356 Accumulators. For mode of operation. Standpoint of service
.2 Mechanically classified accumulators
.22 Transportable types. Light-weight types
(See also .335, Electric automobiles)
.25 Movable electrode or electrolyte types
.3 Accumulators classified by nature and arrangement of electrolyte
.32 Dry accumulators
.33 Double liquid or additive voltage accumulators
.34 Charged electrolyte accumulators
.35 Accumulators classified by nature and arrangement of electrodes
.352 Batteries
.353 Bipolar electrode accumulators
.4 Accumulators classified by voltage
.45 „ „ by current
.6 „ „ for other modes of operation
With special charging constructions
With electrolytes for A. C. and D. C.
.8 Care. Handling. Manipulation
.82 Charging and discharging. General
Charge and discharge curves
.83 Accumulator charging (See also .335 Automobile charging stations)
Methods of charging. Dynamo and battery methods
Charging regulations and requirements
Phenomena detrimental in charging
Explosions. Gas evolution. Boiling. Over-charging.
Reverse charging. Current regulation. Polarity tests.
.84 Accumulator discharging
Regulations and requirements
Discharge limits. Current strength
.88 Phenomena detrimental to accumulators. Secondary reactions
Buckling. Pulverizing of plates. Crumbling. Precipitation.
Leakage. Internal short-circuits. Gas. Acidity changes

621 Mechanical Engineering (continued)

.356.89 Residues. Exhausted solutions. Cleansing
Recovery and use of residues and exhausted solutions

.357 Applications of accumulators
To traction, car-lighting, etc.

.358 Light-sensitive chemicelectric generators
Photoelectric cells. Selenium cells
(See also [54]117.68)

.36 Thermoelectricity and electrothermics

.361 General. Transformations between thermal and electric energy

.3 Technical properties.

4. Reactions

.362 Thermoelectric cells and apparatus

.1 General. Methods of making joints. (See also [54]117.288.5)

.9 Applications of thermoelectric cells. Thermometers

.364 Electrothermics. Electric Heating. (See also [54]245.7)

.1 General

.17 General accessory apparatus
Special regulators of current and temperature

.2 Radiators. Stoves

.3 Receptacles. Pots. Smelters

.5 Utensils. (Subd. by constructions)

.6 „ (Subd. by nature of application)
For gases; liquids, distillation; solids; cooking; medical and scientific uses

.7 Apparatus
For soldering, forging, riveting, welding

.9 Various applications of electric heating
Fuses, Apparatus. Standpoint of manufacture
(See also .372.245 fuse compounds)

365 Apparatus for electrometallurgy. Electric furnaces
Standpoint of manufacture
(For standpoint of use see also [669].837, [669].857., [661].113.7 and [661].115.7)

.5 Electric furnaces. (Subd. by electric character)

.51 General

.52 Arc furnaces. Reflected arc furnaces. Series arc furnaces

.53 Resistance furnaces. General

.54 Direct resistance furnaces. (Charge being the current carrier)

.55 Indirect resistance furnaces

.552 „ „ „ Core being current carrier

.553 „ „ „ Lining or jacket being current carrier
Oxide jacket types. Solid electrolyte jacket types. Carbon tube furnaces

.56 Induction furnaces

.57 Arc—resistance types

.6 Electric furnaces (Subd. by operative character and form)

.62 By character of current

621 Mechanical Engineering (continued)

.365.623 D. C. furnaces. Special types
.624 A. C. furnaces
.63 By operative character of furnace
.632 Continuous furnaces
.633 Periodic furnaces
.64 By special gas control of furnace
.642 Sealed furnaces. (Without gas pressure)
.643 Hermetic furnaces. (With gas pressure)
.65 By thermal character of furnace
.652 Regulatable temperature types
.653 Non-uniform heat distribution types
.655 Thermally aided types. General
.2 Externally heated furnaces
.3 Internally „ „
.656 Furnaces heated by fuel combustion. (By gas etc.)
.657 Furnaces also electrically heated
.66 Electric furnaces. Classified by form of furnace
.662 Fixed types
.663 Rotatable types
.664 Compound and triple furnaces. Tiered furnaces
(Parts doing different work)
.665 Duplex or tandem furnaces
(Parts doing same work. Plurality of hearths.)
.666 Shaft furnaces. High furnaces
.667 Crucible or pot furnaces
.669 Other forms of furnaces. Tubular forms
.7 Thermoelectric apparatus
.71 Containers and jackets
.72 Internal accessories
Linings. Resistances. Cores. Bottom-plates
.73 Electrodes and their fittings. Terminals
.74 Charge-forms. Hoppers. Feed-mechanisms. Conveyors
.75 Regulators of current, temperature etc.
Apparatus for furnace product control
.76 Vents. Taps. Conduits
(For products, by-products and gases)
.77 Other special parts
Heat concentrators. Reflectors. Special bus-bars
Refractory material in general
.78 Thermoelectric apparatus. Parts in intermittent service
.782 Tools and apparatus for furnace manufacture and installation
.783 Tools for furnace manipulation
Hooks. Pokers. Drills. Protective devices
.784 Tools and apparatus for furnace repairs
.9 Electric furnaces. By applications (Subd. with colon)

621 Mechanical Engineering (continued)

.366 Igniters. Ignition by electricity
.1 Electric ignition. General
.2 Igniters. Classified by electric character
.22 Spark igniters. Contact-break and induced spark types
.23 Resistance igniters. Incandescent igniters
.27 Accessory and constituent parts
.3 Igniters. Classified by form and mode of operation
.4 „ By applications

.37 Apparatus for Electrochemistry, Electrolysis, Electroplating

.371 General
.4 Raw materials for electrochemical apparatus
.8 Tests
.372 Chemicelectric apparatus and material
Chemical characteristics influencing electrical properties
.2 Chemical material influencing resistance and conductivity
.22 Resistance mixtures. Metallic compounds. Powdered mixtures
.24 Resistors. Types
.242 Imperfect contact conductors
Coherers. Polariters, etc.
Tapping, torsional, self-recovering coherers
Liquid barretters. Electrolytic wave detectors
.243 Transmitters. Powdered microphones
.244 Glowers. Filament compounds (See also .326)
.245 Fuses. Compounds (See also .364.9 Fuses, apparatus)
.246 With gaseous transmission.
Electromanometer flames. Ionized spark-gaps
.247 Dielectric material. Insulation compounds
.374 Electrochemical and metallurgical apparatus. General. Standpoint of manufacture (See also .365.7 Thermoelectric apparatus.) (Subd. in general as .365.7)
.3 Electrodes for electrolysis of cold solutions. Manufacture
.377 Electrochemical and -metallurgical apparatus.
By operative character and form
.378 Apparatus for special electrochemical industries
.1 Apparatus for bleaching and disinfection
.11 Apparatus for bleaching
.12 Apparatus for disinfection. General
.13 Apparatus for disinfection or sterilization of drinking water (See also [628] .16; [663] .637)
.14 Apparatus for disinfection of sewage. (See also [628] .337)
.15 Apparatus for fertilizer manufacture from sewage
.2 Apparatus for impregnations and dehydrations
For dehydrating wood. For electric tanning of skins and hides
.7 Electrical instruments and meters acting electrochemically
(See .317 Electric instruments and meters)
.9 Other electrochemical apparatus
.94 Apparatus for catalytic action. Catalytic igniters

621 Mechanical Engineering (continued)

.379 Apparatus for electrochemistry. By applications
.6 (Subdivided as [66] Chemical technology)
.69 (Subdivided with colon as [669] Metallurgy)

.38 Electrotherapeutic and scientific apparatus

.381 Electrotherapeutic apparatus. General
.7 Special electrotherapeutic measuring instruments
.382 Electrostatic therapeutic apparatus
.383 Direct current therapeutic apparatus
.384 Undulatory current therapeutic apparatus
.1 Faradic " " "
.2 Alternating or oscillatory current therapeutic apparatus
.3 Pulsatory current therapeutic apparatus
.4 High frequency current therapeutic apparatus
.385 Other electrotherapeutic apparatus
.1 Electroradiant therapeutic apparatus
.386 Electrical scientific apparatus
.387 " " "
.388 " " "

.39 Other industrial applications of electricity

628 Sanitary Engineering

.1 Water supply of towns

.16 Water impurities and their removal
(See also [663] .637) [621] .378.13)

.3 Disposal of sewage

.33 Physical processes for disposal of sewage
.337 Electrical processes for disposal of sewage
(See also [621] .378.14)

655 Printing

.2 Type and Type-setting

.22 Electro- and stereotyping
.227 Electrotypy (Electroengraving see [669] .877.91)
(Same general arrangement of subdivisions as [669] .877, Electroplating)
.2 Types of electrotyping. Of wood cuts. Of type and stereotype plates. Of engraved copper plates = Galvanography. Of engraved zinc plates = Galvanoglyphics. Photogalvanography (Galvanically engraved plates of photography) Rapid plating.
.3 The plating (Subd. for metals as [669])
.31 Iron and steel plating
.321 Gold plating
.322 Silver plating
.325 Nickel plating
.33 Copper plating

655 Printing (continued)

.227.4 Electrotypy products. Corvinelli, Cliches, Heliotypes
.5 Electrotypy operations
.52 The matrix. Preparation of forms
.522 Special raw material for matrices
.523 Processes
.1 General. Press processes, etc.
.2 Stearine, wax and gelatine processes
.3 Guttapercha processes
.4 Plaster processes
.6 Alloy processes
.524 Finishing of matrices
.525 Conductifying. Graphitizing. Graphitizers
.527 Intermediate plating. Separators
.53 The receptacle (Subd. as [669].877)
.535 Supports of matrices
.54 The bath
.55 Electric connectors. The current
.551 Electric connectors
.552 The current
.553 Sources of current. Battery. Dynamo
.2 Autogenerated
.8 Connections
.82 Shunt connections
.83 Series „
.56 Electrolytic operations
.562.2 Diaphragm processes
.563.2 With aqueous solutions
.6 „ fused salts
.564.2 „ soluble anode
.57 Failures. Causes, Remedies
.58 Varia
.6 Finishing operations (Subd. as [669].877.6) Blocking. Etching
.7 Apparatus for electrotypy. Component and accessory
.8 Varia
.9 Special applications. Money. Medals. Bank-notes

66 CHEMICAL TECHNOLOGY

661 Manufacture of Chemicals

661.0 Special Analytic Subdivisions for Manufacture of Chemicals.

(The special affixes for Maufacture of chemicals are formed by prefixing .0 to the main subdivisions of [661]. Thus "an electrolytic process for sodium hydroxide production" would be .333.0113.75.

.1 General considerations and small chemical industries of compounds

11 General Considerations

(Subdivide precisely as [661] .0)

111 Sources. Minerals

.111.1 Sources. Statistics of production

.12 Sources. Geographically subdivided

.13 Nature of the beds

.14 Methods of securing

.18 Statistics of production

111.5 Minerals

.51 Elements. Native metals

.52 Chlorides and fluorides

.53 Oxides

.54 Sulphides and corresponding combinations

.55 Sulphates

.56 Borates, Silicates

.57 Nitrates

.58 Carbonates

.59 Other minerals

112 Properties and constants. Nomenclature and classification

.1 Nomenclature

.2 Structure and constitution of metals, minerals and products

.3 Physical properties and constants (Subd. as [53])

.36 Temperature coefficients

.373.34 Conductivity

.373.343 Temperature coefficient of conductivity

.373.35 Current density

.4 Chemical properties and constants (Subd. as [54])

113 Production by processes. From ores etc. (For refining see .05) Procedure. Methods. Apparatus. Efficiencies. Separation

.1 General

.18 Efficiencies

.2 Consumed material. Raw material

.21 Consumed material

.22 Fuels and furnaces

.227 Furnaces 1) General (Special furnaces under different fuels)

25 Raw material

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1) (Furnaces will probably be used here only as affixes, for metallurgists)

661 Manufacture of Chemicals (continued)

.113.3 Preliminary and intermediate operations
.31 Preliminary operations. General
.32 Crushing. Grinding. Pulverizing
.33 Screening. Sorting. Mixing
.34 Oxidation. Calcining. Roasting. Smelting
.35 Washing. Dissolving. Lixivating
.36 Other preliminary operations
.37 Intermediate operations. Concentration
.4/.9 Processes of reduction and manufacture
.4 Wet processes and apparatus
.5 Gaseous processes and apparatus
.6 Thermal processes and apparatus. Fusion processes
.67 Production by aluminothermics (See also [669].766.91)
.7 Electrical processes and apparatus
.71 General. Current Density. Circulation
.717 General apparatus. Constituent and accessory
.72 Electrothermic processes
Electric smelting (of ores)
„ melting (of mixtures etc)
.73 Electrolytic processes and apparatus. General
.74 Electrolytic fusion processes and apparatus
.75 Electrolysis of solutions
.76 Other electrolytic processes
.761 Autoelectrolytic processes. Internal electrolysis
.762 Indirect and secondary electrolytic processes
.763 Colloidal processes
.764 Catalytic processes
.765 Alternating current electrolytic processes
.77 Brush and spark discharge processes and apparatus
.772 Spark discharge processes
.775 Brush „ „
Silent „ „
.78 Other electric processes
.8 Magnetic processes and apparatus
.9 Other processes and apparatus
.91 Mechanical processes and apparatus

.114 **Production by products.** Types of products. Qualities of products
Colloidal, crystalline qualities
.1 General
.2 Manufacture of pure chemicals
.7 By-products
.75 Manufacture as a by-products
.79 Utilization of by-products
.8 Slags. Scoria
.85 Wastes
.859 Utilization of wastes

661 Manufacture of Chemicals (continued)

.115 Refining. Purification
From crude chemical or metal. For production from ores etc. see .113
.2 Impurities (Subd. for the impurity —1 as 661, —9 as 669)
.3 Refining. General
.4 Wet methods of refining (Subd. as .113.4)
.5 Gaseous methods of refining
.6 Thermal " " "
.7 Electrical " " " (Subd. as .113.7)
.8 Magnetic " " "
.9 Other methods
.91 Mechanical methods

.116 Alloys. Production and as chemical substances
.86 Amalgams

.117 Working. Manipulation. Treatment
.2 Bending, Straightening Corrugating
.3 Forging, Pressing, Rolling, Hammering, Riveting, Squeezing, Drawing, Stamping
.4 Cutting, Shearing, Drilling, Boring, Slotting, Planing, Turning, Punching
.5 Casting, Welding, Soldering, Tempering
.6 Plating
.7 Electroplating
.8 Grinding. Polishing, Filing, etc.

.118 Various
.1 Analyses. Tests
.12 Qualitative analyses
.127 " " Electric —
.13 Quantitative "
.137 " " Electric —
.14 Assaying
.15 Tests of material
.118.6— 118.9 Reserved for special subdivision under each branch of [669]

.119 Uses. Applications
.12 Small chemical industries of compounds. Oxides
(Subdivided .12 through .19 as [54]6)
.1 21 Oxygen salts (Oxygen see .93)
.1 22 Oxides
.13 Small chemical industries of compounds
.1 31 Alkali group compounds
.1 32 Potassium compounds. (Metal see [669] .732)
.1 33 Sodium " " " " .733)
.665 Borax
.1 34 Lithium compounds. (Metal see [669] .734)
.1 35 Rubidium " " " " .735)
.1 36 Caesium " " " " .736)
1 39 (Ammonium compounds see .5)

661 Manufacture of Chemicals (continued)

.1 4 Alkaline earth compounds
.1 41 Calcium compounds. (Metal see [669] .741)
.44 Bleaching powder
.1 42 Strontium compounds. (Metal see [669] .742)
.1 43.1 Barium „ „ „ „ .743.1)
.2 Radium „ „ „ „ .743.2)
.1 44 Magnesium group compounds
.1 45 Beryllium compounds (Metal see [669] .745)
.1 46 Magnesium „ „ „ „ .746)
.1 47 Zinc „ „ „ „ .5)
.1 48 Cadmium „ „ „ „ .748)
.1 5 Lead group compounds
.1 51 Lead compounds. (Metal see [669] .4)
.1 52 Thallium „ „ „ „ .752)
.1 55 Silver group compounds
.1 56 Copper compounds. (Metal see [669] .3)
.1 57 Silver „ „ „ „ .22)
.1 58 Mercury „ „ „ „ .758)
.1 6 Cerium group compounds
.1 61 Yttrium compounds. (Metal see [669] .761)
.1 62 Cerium „ „ „ „ .762)
.1 63 Lanthanum „ „ „ „ .763)
.1 64 Didymium „ „ „ „ .764)
.1 64.1 Praseodymium compounds. (Metal see [669] .764.1)
.2 Neodymium „ „ „ „ .764.2)
.1 65 Erbium „ „ „ „ .765)
.1 66 Aluminum compounds. (Metal see [669] .766)
.123 Aluminum oxides. Corundum. Alundum.
.83 Alums
.84 Aluminum silcates
.84 .133 Sodium aluminum silicate = Ultramarine
.1 67 Indium compounds. (Metal see [669] .767)
.1 68 Gallium „ „ „ „ .768)
.1 69.1 Scandium „ „ „ „ .769.1)
.2 Samarium „ „ „ „ .2)
.4 Gadolinium „ „ „ „ .4)
.5 Germanium „ „ „ „ .5)
.1 7 Iron group compounds
.1 71 Manganese compounds. (Metal see [669] .71)
.1 72 Iron „ „ „ „ .1)
.1 73 Cobalt „ „ „ „ .24)
.1 74.1 Nickel „ „ „ „ .25)
.1 75 Chromium group compounds
.1 76 Chromium compounds. (Metal see [669] .26)
.83 Chrome alums
.1 77 Molybdenum compounds. (Metal see [669] .27)
.1 78 Tungsten (Wolfram) compounds. (Metal see [669] .28)
.1 79.1 Uranium compounds. (Metal see [669] .779.1)
,1 8 Tin group compounds
.1 81 Tin compounds. (Metal see [669] .6)
.1 82 Titanium „ „ „ „ .782)

661 Manufacture of Chemicals (continued)

.1 83 Zirconium compounds (Metal see [669] .783)
.1 84.1 Thorium „ „ „ „ .784.1)
.1 85/89 Vanadium group compounds
.1 85 Vanadium compounds. (Metal see [669] .785)
.1 86 Antimony „ „ „ „ .786)
.1 87 Bismuth „ „ „ „ .787)
.1 88 Tantalum „ „ „ „ .788)
.1 89.1 Niobium „ „ „ „ .789.1)
.1 9 Platinum group compounds
.1 91 Gold compounds. (Metal see [669] .21)
.1 92 Platinum „ „ „ „ .232)
.1 93 Iridium „ „ „ „ .233)
.1 94.1 Osmium „ „ „ „ .234.1)
.1 95 Ruthenium group compounds
.1 96 Ruthenium compounds. (Metal see [669] .236)
.1 97 Rhodium „ „ „ „ .237)
.1 98 Palladium „ „ „ „ .238)

.2 Acids

.2 4 Halogen acids
.2 41 Chlorine acids
.2 43 Hydrochloric acid, HCl
.2 44 Chlorous acid, $HClO_2$; Hypochlorous acid, HClO
.2 45 Chloric acid, $HClO_3$
.2 46 Other chlorine acids
.2 462 Perchloric acid $HClO_4$
.2 47 Bromine acids (same subd.)
.2 48 Iodine acids („ „)
.2 49 Fluorine acids („ „)

Metalloid element acids

.2 61 Sulphur acids
.2 614.2 Hyposulphurous acid, $H_2S_2O_4$
.3 Sulphurous acid, H_2SO_3
.38 Liquid „ „
.4 Thionic acid, $H_2S_2O_3$
.5 Dithionic acid, $H_2S_2O_6$
.6 Trithionic acid, $H_2S_3O_6$
.7 Tetrathionic acid, $H_2S_4O_6$
.8 Pentathionic acid, $H_2S_5O_6$
.2 615 Sulphuric acid, H_2SO_4
.2 616.2 Persulphuric acid, $H_2S_2O_8$
.3 Pyrosulphuric acid, $H_2S_2O_7$
.2 62 Nitrogen acids
.2 624.2 Hyponitrous acid
.3 Nitrous acid
.2 625 Nitric acid
.2 63 Phosphorus acids
.2 634.2 Hypophosphorous acid, H_3PO_2
.3 Phosphorous acid, H_3PO_3
.4 Metaphosphorous acid, HPO_2
.2 635 Orthophosphoric or phosphoric acid, H_3PO_4
.2 636.2 Hypophosphoric acid, $H_4P_2O_6$

661 Manufacture of Chemicals (continued)

.2 636.3 Pyrophosphoric acid, $H_4P_2O_7$
.4 Metaphosphoric acid, HPO_3
.2 64 Arsenic acids
.2 644 Arsenious acid
.2 645 Arsenic acid
.2 655 Carbonic acid
.2 665 Boric acid
.2 675 Silicic acid
.2 681.4 Selenious acid
.2 682.5 Telluric acid
.2 69 Metallic element acids
.2 695.14 Plumbous acid
.2 697.15 Manganic acid
.162 Permangenic acid
.75 Molybdic acid
.85 Tungstic acid
.2 698.15 Stannic acid
.16 Metastannic acid

.3 Alkalies. Bases [1])

.3 31 General
.3 32 Potassium hydroxide
.3 33 Sodium „
.3 34 Lithium „
.3 35 Rubidium „

.4 Halogen compounds (Halogen acids see .2 4)

.41 Chlorine. Chlorine compounds. General
.413 Chlorine
.42 Chlorine salts
.43 Chlorides
.44 Chlorine-oxygen radicle compounds (low valency)
.442 Hypochlorites
.443 Clorites
.45 Clorine-oxygen radicle compounds (moderate valency)
Chlorates
.46 Chlorine-oxygen radicle compounds (high valency)
.462 Perchlorates
.47 Bromine. Bromine compounds (same subd. as Chlorine compounds)
.48 Iodine. Iodine „ „ „ „ „ „
.49 Fluorine. Fluorine „ „ „ „ „ „

.5 Ammonia and ammonium salts

.52 Ammonia and liquid ammonia
.526.7 Synthesis of ammonia
.526.8 Liquid ammonia
.5 3 Ammonium hydroxide
.5 43 „ chloride
.5 613.2 „ hydrosulphide
.3 „ sulphide

[1]) "A base is a substance composed of a metal with hydrogen and oxygen". Group subdivided as [54]6. (i. e. as .13—.19).

661 Manufacture of Chemicals (continued)

.5 615 Ammonium sulphate
.5 624.3 „ nitrite
.5 625 „ nitrate
.5 635 „ phosphate
.5 655 „ carbonate

.6 Metalloids and their compounds. Sulphates. Nitrates. Etc.

.61 Sulphur and its compounds
.611 Sulphur
.612 Sulphur salts
.123 Sulphur oxides
.43 „ chlorides
.613 Sulphides and hydrosulphides
.2 Hydrosulphides
.3 Sulphides
.2 .652 Carbon disulphide
.614 Sulphur-oxygen radicle compounds (low valency)
.2 Hyposulphites. Thiosulphates
.3 Sulphites
.615 Sulphates
.616 Sulphur-oxygen radicle compounds (high valency)
.2 Persulphates

.62 Nitrogen compounds (for nitrogen and for N oxides see .98)
.623 Nitrides
.624.3 Nitrites
.625 Nitrates

.63 Phosphorus and its compounds
.631 Phosphorus
.4 Amorphous or red phosphorus
.632 Phosphorus salts
.123 Phosphorus oxides
.43 „ chlorides
.613 „ sulphides
.618 „ chlorosulphide
.963 „ hydrides
633 Phosphides
.634 Phosphor-oxygen radicle compounds (low valency)
.2 Hypophosphites
.3 Phosphites
.4 Metaphosphites
.635 Phosphates
.636 Phosphor-oxygen radicle compounds (high valency)
.2 Hypophosphates
.3 Pyrophosphates
.4 Metaphosphates

.64 Arsenic and its compounds
.641 Arsenic
.642 „ salts
.643 Arsenides
.644.2 Hydroarsenites
.3 Arsenites
.645 Arsenates

661 Manufacture of Chemicals (continued)

.65 Carbon and its compounds
.651 Carbon
.32 Diamond
.33 Graphite
.4 Amorphous carbon
.652 Carbon salts
.653 Carbides
.672 (Silicon carbide. Carborundum. Auxilliary decimal)
.654.2 Thiocarbonates
.655 Carbonates. Acid carbonates. 'Bicarbonates.'
.656.2 Percarbonates

.66 Boron and its compounds
.661 Boron
.662 „ salts
.663 Borides
.665 Borates
.133 Borax

.67 Silicon and its compounds
.671 Silicon
.672 „ salts
.653 Carborundum (Chief decimal)
.673 Silicides
.675 Silicates
.678.2 Silicon alloys

.68 Other metalloids and their compounds
.681 Selenium and its compounds
.1 Selenium
.2 „ salts
.3 Selenides
.5 Selenates
.682 Tellurium and its compounds
.1 Tellurium
.2 „ salts
.3 Tellurides
.5 Tellurates

.69 Salts with metallic acid-radicles (Subd. as .1)
.695.1 Lead salts
.15 Plumbates
.696.6 Aluminum salts
.65 Aluminates
.697.1 Manganese salts
.15 Manganates
.162 Permanganates
.2 Iron salts
.25 Ferrates
.6 Chromium salts
.65 Chromates
.662 Bichromates
.663 Trichromates
.7 Molybdenum salts
.75 Molybdates

661 Manufacture of Chemicals (continued)

.697.8 Tungsten salts
.85 Tungstates
.91 Uranium salts
.915 Uranates
.698.1 Tin salts
.15 Stannates
.5 Vanadium salts
.55 Vanadates
.8 Tantalium salts
.85 Tantalates
.91 Niobium salts
.915 Niobates
.699.2 Platinates

.7 Organic preparations. (Subd. as [54] 7)

.71 Cyanogen compounds. Cyanides.
.713 Cyanides
.715 Cyanates
.718 Complex cyanogen compounds with metals. Prussiates
.72 Hydrocarbons
.73 Alcohols, phenols and derivatives
.74 Ethers
.77 Organic acids
.771 Acetic acid. Acetates

.8 Complex salts, inorganic and organic
(Not to be subdivided)

.9 Gases. Also compressed and liquefied gases
(Ammonia see .52; halogen gases see .4)

.91 Compressed and liquefied gases Generalities
Compressers. Receivers.
.92 Air
.93 Oxygen and its gases (For oxides see .122)
.931 Oxygen
.6 Liquid oxygen
.932 Ozone
.933 'Knall' gas
.96 Hydrogen and its compounds
.961 Hydrogen
.962 „ compounds (H as base; see also acids)
.123 Hydrogen peroxide
.613.3 „ sulphide
.963 Hydrides
.186.2 Stibine
.632 Phosphine
.642 Arsene
.97 Carbonic acid gas and carbon monoxide (For carbonates see .655)
.98 Nitrogen and its inorganic gases (For nitrates etc. see .62)
.99 Other gases
.991 Helium
.992 Neon

661 Manufacture of Chemicals (continued)

.993 Argon
.994 Krypton
.995 Xenon

Decimal Affixes for Salts in Chemical Technology.

123	Oxides. Anhydrides	636.3	Pyrophosphates
166.83	Alums	.4	Metaphosphates
.84	Ultramarines	643	Arsenides
176.83	Chromalums	644.2	Hydroarsenites
2	Acids	.3	Arsenites
3	Hydroxides	645	Arsenates
43	Chlorides	653	Carbides
442	Hypochlorites	655	Carbonates. Acid carbonates
443	Chlorites	656.2	Percarbonates
	Oxychlorides	663	Borides
	e. g. $MoOCl_4$	665	Borates
45	Chlorates	673	Silicides
462	Perchlorates	675	Silicates
473	Bromides	681.3	Selenides
474.2	Hypobromites	.5	Selenates
.3	Bromites	682.5	Tellurates
475	Bromates	695.15	Plumbates
483	Iodides	696.65	Aluminates
485	Iodates	697.15	Manganates
493	Fluorides	.162	Permanganates
495	Fluorates	.25	Ferrates
613.2	Hydrosulphides	.65	Chromates
.3	Sulphides	.662	Bichromates
614.2	Hyposulphites	.663	Trichromates
.3	Sulphites	.75	Molybdates
615	Sulphates	.85	Tungstates
616.2	Persulphates	.915	Uranates
618	Complex sulphur comp.	698.15	Stannates
	(SCl comp.)	.55	Vanadates
623	Nitrides	713	Cyanides
624.3	Nitrites	715	Cyanates
625	Nitrates	718	Complex cyanogen comp.
633	Phosphides		$Fe(CN)_6$, $Co(CN)_6$,
634.2	Hypophosphites		$Ni(CN)_4$
.3	Phosphites	771	Acetates
635	Phosphates	8	Complex comp. of element
636.2	Hypophosphates	963	Hydrides

Subdivisions of an element.

e. g. .631 Phosphorus
.1 Forms of phosphorus. General
.2 Solid forms of phosphorus
.3 Crystalline forms of phosphorus
.4 Amorphous „ „ „
.5 Colloidal „ „ „
.6 Liquid „ „ „
.8 Gaseous „ „ „

669 Metallurgy

669.0 Special Analytic Subdivisions for Metallurgy

(The special affixes for Metallurgy are formed similarly to those for [661] by prefixing .0 to the main subdivisions of [669].)

.1 Iron and steel

(Main subdivisions like those of .8)

.11 Sources and minerals of iron

.111 Sources. Statistics of production of iron and steel
.2 Sources. (Geographically subdivided)
.8 Statistics of production
.115 Minerals. Ores

.12 Nomenclature. Properties and constants of iron and steel

.121 Nomenclature of iron
.122 Structure and constitution of iron and steel
Carbon states. Etchings. Microscopic structures
.123 Physical properties of iron and steel
Temper. Ductility. Strength
.124 Chemical properties of iron and steel
Corrodibility. (For influence of sulphur, phosphorus, etc., see .152.)

.13 Production (by processes) of iron and steel

Puddling, Open-hearth, Bessemer processes.
.131 General
.8 Efficiencies
.132 Consumed material. Raw material
.133 Preliminary and intermediate operations (Subd. as [661] .113.3)
.137 Electric processes (see also .837)

.14 Production (by products) of iron and steel

.142 Manufacture of pure iron
.143 „ „ pig iron. Cast iron. Ingot iron
.144 „ „ malleable iron. Wrought iron
.145 „ „ steel
(Electric mfg of steel .145 .0837; or .137)
.147 By-products of iron and steel manufacture
.148 Slags and scoria from iron and steel
.5 Wastes from iron and steel manufacture
.59 Utilization of wastes from iron and steel manufacture

.15 Refining. Purification

.152 Impurities
.161 Sulphur
.163 Phosphorus
.153 Refining. General
.154 „ Wet processes
.157 „ Electric „ (Subd. as [661] .113.7)

.16 Alloys of iron and steel. Special steels

Manganese steel. Nickel steel. (Subd. for metal as [669])

.17 Working, manipulation, treatment of iron and steel

(Subd. as [661] .117)

669 Metallurgy (continued)

.172 Forging, rolling, etc.
.173 Welding, Soldering
.174 Tempering
.176 Plating, Galvanizing
.177 Electroplating. Electric etching (Subd. as [669].877)
.3 With iron (Subd. with — for material plated)
.4 On iron („ „ — „ plating material)

.18 Varia

.181 Analyses. Tests
2 Qualitative analyses of iron and steel
.27 „ „ „ „ „ „ Electric
.3 Quantitative analyses of iron and steel
.37 „ „ „ „ „ „ Electric
.5 Tests of iron and steel. Tension, compression, torsion, etc.

.186 to .189 reserved for special considerations of iron and steel

.19 Uses of iron and steel

.2 Precious metals and the rare metals of steel
.21 Gold (subd. as for .1 iron)
.22 Silver
.23 The platinum metals
.232 Platinum
.233 Iridium
.234.1 Osmium
.236 Ruthenium
.237 Rhodium
.238 Palladium
.24 Cobalt
.25 Nickel
.26 Chromium
.27 Molybdenum
.28 Tungsten (Wolfram)
.3 Copper
.36 5 Brass
.36 56 Bronze
.4 Lead
.5 Zinc
.6 Tin
.7 Other metals
.73 Alkali metals
.732 Potassium
.733 Sodium
.734 Lithium
.735 Rubidium
.736 Caesium
.74 Alkaline earth metals
.741 Calcium
.742 Strontium
.743.1 Barium
.2 Radium
.744 Magnesium group metals
.745 Beryllium
.746 Magnesium
.748 Cadmium
.752 Thallium
.758 Mercury
.76 Cerium group metals
.761 Yttrium
.762 Cerium
.763 Lanthanum
.764 Didymium
.1 Praeseodym
.2 Neodym
.765 Erbium
.766 Aluminum
.91 Aluminothermics. Thermite
.767 Indium
.768 Gallium
.769.1 Scandium
.2 Samarium
.3 Dicipium
.4 Gadolinium
.5 Germanium
.77 Iron group metals
.771 Manganese
.779.1 Uranium
.78 Tin group metals
.782 Titanium
.783 Zirconium
.784.1 Thorium
.785 Vanadium
.786 Antimony
.787 Bismuth
.788 Tantalum
.789.1 Niobium

669 Metallurgy (continued)

.8 Metallurgy. General considerations
(Subd. in general as [661].11)

.877 Electroplating. Electric etching. (Glyphography, Voltaglyphy)
(See also [54]117.354)
(For electrotyping or galvanoplastics see [655].227)
(Special point of view affixes for this group formed by prefixing the zero and subdivisions of this group.)

.1 General
.2 Types of electroplating
.21 Classified by thickness
.22 Light thickness types. Niellos
.23 Heavy thickness types
.24 Dip plating
.25 Contact plating
.27 Various plating types. Pattern plating. Plating of moulds. Double layer plating. Incrustations. Damasquinerie.
.271 Chromaturgy or metal coloring. (Metallochromy)
.272 Iridescent plating. (Interference plating)
.28 Special plating
(Reserved for special subdivision under each chemical element)
.3 The plating. Electroplating by material
(Subdivided decimally as [669])
.31 Iron plating
.321 Gold plating
(Each metal to be subdivided decimally precisely as .877)
" " " " " with dash " " [669] for substance plated)
— 0 Gold plating on numerous metals
— 1 Gold plating on iron
— 8 " " " various substances (sub. as [66])
.52 Preparation of the article to be gold plated
.53 The receptacle for gold plating
.54 The bath for gold plating
.55 The current for gold plating
.56 Operations of gold plating
.57 Failures of gold plating. Imperfections
.6 Finishing of gold platings
.7 Apparatus, general, for gold plating
.84 Recovery of wastes from gold plating
.86 Tests of gold platings
.322 Silver plating (Subd. as .877.321 Gold plating)
.323.2 Platinum plating
.324 Nickel plating
— 56 German silver plating
.33 Copper plating
.336 — 5 Brass plating
— 56 Bronze plating

669 Metallurgy (continued)

.877.35 Zinc plating
.36 Tin plating
.4 The plated material. Electroplating on material. (subd. as [669])
.41 Plating on iron
.42 „ „ the precious metals
.43 „ „ copper
.44 „ „ lead
(Each metal may be subdivided decimally as .877; each metal may be subd. with dash, —, for plating material as [669]. — 0 plating with various metals.)
.48 Plating on various substances
.482 On chemical or biological substances
.483 „ ceramics. On glass, porcelain, clay, cement
.484 „ wood
.485 „ leather
.486 „ paper
.487 „ textiles. On cotton, wool, silk, linen, felt
.488 „ rubber
.489 „ celluloid etc.
.49 Plating on special articles (For manufacture of articles see .877.92)
.492 On chemical or biological articles
On crystals, mosses, fruits
.493 On articles of the useful arts
.7 On textiles. On laces
.494 On metallic articles
.2 On hardware. On screws, nails, wire, cooking-utensils
.3 „ cutlery
.4 „ watches and instruments
.495 On other useful articles. On ships
.496 On articles of the fine arts
.2 On jewelry and silverware etc.
.497 On sculptures and decorations
On statues, medals, stained glass
.498 On engravings (See also electrotyping [655] .227 and electro-engraving .877.91)
.499 On other artistic articles
.1 On musical instruments
.5 Electroplating operations. (Only to be used for general articles. For special articles these subdivisions are used under the metals of .3 and .4)
.52 The article
.522 Preparation of the article
.523 „ „ „ surface. Cleansing
Removal of oxide, scale and of old plate
.1 With abrasion
.2 With sand
.27 Sand-blast machines

669 Metallurgy (continued)

.877.523.3 With brushes
.37 Brush-machines. Scrapers
.6 With acid pickling
.67 Pickling pots and furnaces
.7 Removal of old plate
.525 Conductifying. Graphitizing
.526 Shielding
.7 Shields
.527 Intermediate plating
.53 The receptacle
.531 General. Size, capacity
.532 Material. Linings
.535 Supports for articles. Arrangements of articles. Trays. Drums
.54 The bath. (Employed for general articles; otherwise with 0 as an affix for other subdivisions of [669] .877.)
.541 General
.541.2 Solution. Concentration. Dissolving
.3 Properties of the bath. Resistance
.5 Purity and quality of chemicals. Solution water.
.6 Temperature
.7 General proceedure. Circulation
.8 Bath alterations. Alkali increase. Acid increase
.542 Acid baths
.543 Alkali baths
.544 Neutral „
.545 Cyanidic baths
.546 Auxilliary salts. Conducting salts
.55 Electric connectors. The current
.551 Electric connectors
.2 Leads, terminals, hooks, clamps
.3 Electrodes
.552 The current
.553 Sources of current for electroplating
.2 Autogenerated; .3 Battery; .4 Accumulator; .5 Dynamo; .8 Connections; .82 Shunt; .85 Series
.554 Bath voltage
.555 Current density
.556 Polarization
.557 Apparatus. Current regulators
.558 Yield. Precipitate thickness per unit of time
.56 Electrolytic operations
.562 Classification by character of apparatus
.2 Diaphragm processes
.563 Classification by nature of solution
.2 With aqueous solutions
.6 „ fused salts. Oxidizable; nonoxidizable

669 Metallurgy (continued)

.877.564 Classification by electrode function
.2 With soluble anode
.57 Failures. Imperfections
In color
In structure of the precipitate
In cohesion " "
In density " "
.58 Varia of processes
.6 Finishing
.62 Drying
.63 Oxidizing, etc (For electro-oxidizing see .877.38)
.64 Matting
.65 Polishing. Burnishing
.657 " " Apparatus and tools
.7 Apparatus. Component and accessory
(In general, for apparatus concerning any special process, see that process)
Flues. Electric panels
.8 Various considerations
.84 Recovery of wastes from baths, etc.
.86 Tests of plated article
Determination of precipitate weights. Special ballance.
.9 Applications
Manufacture of mirrors, parabolic reflectors, and specula.
Filling-in stained glass. Statuary (completely of electroplate)
Mfg. of plates for graining leather
.91 Electro-engraving. (Voltaglyphy). Electric etching (Glyphography = Galvanoglyphy)
.92 Manufacture of tubing etc.
.9 Assaying

Subdivisions Applicable to All of Pure and Applied Science.

(00) Special subdivisions of form. Manuscripts.

(001) Documents. Statistics
(002) Quantities and cost. Current prices. Price-lists
(For estimates see (004).)
(003) Contracts and specifications
(004) Designs and drawings. Estimates
(005) Plans of execution. Executive
Nomenclature and list of parts. Instructions for construction
(006) Working, preservation and maintenance of material. Receipts for
(007) Rules. Regulations. Instructions
(008) Patents. Specifications
(008—42) English patents
(008—43) German "
(008—44) French "

Generalities (continued)

(008—494) Swiss „
(008—73) American „
(009) Reports on operation and on related facts

(0) General subdivisions of form, generalities and geography.

(01) General theory
(02) Treatises. Text-books
(03) Encyclopedias
(04) Essays
(05) Periodicals
(06) Societies. Institutions
(07) Teaching
(08) Polygraphy. Diaries
(083.5) Computing tables
(083.6) Tabulated data
(09) History
(091) Bibliography
(092) Biography
(4) Europe
(41) Scotland
(415) Ireland
(42) England
(43) Germany
(436) Austria
(437) Bohemia
(439) Transleithania, Hungary
(44) France
(45) Italy
(46) Spain
(469) Portugal
(47) Russia
(48) Norway, Sweden, Denmark
(49) Minor european countries
(5) Asia
(6) Africa
(7) North America
(71) British America
(72) Mexico
(728) Central America
(729) West Indies
(73) United States
(74) North Eastern States
(75) South „ „
(76) „ Central „
(77) North „ „
(78) Western States
(79) Pacific „
(8) **South America**
(9) **Oceania**

.00 Common Analytic Subdivisions.

.001 Conception or improvement of the object
Texts and researches
.002 Execution. Construction
Operations of manufacture. Components. Raw material
.003 Economy. (Mercantile)
Efficiencies. Economy of production. Costs-of labor, etc. Sale. Prices
Profit and loss
.004 Service. Operation
Rules for operating. Preservation. Maintenance. Wear. Repairs.
Use of residues and by-products
.005 (Not assigned)
.006 Plants
(For details of internal organization and construction)
Sites. Buildings. Furnishings. Machinery
.0067 Machinery
.00671 Large or rigid machinery
.00672 Small or mobile machinery
.007 Personnel
Scientific. Executive. Mercantile. Laboring
.008 (Not assigned)
.009 „ „

Expansions to the Code.

⟨53⟩ 525.22 Definitions in radioactivity
.23 Laws „ „
(Subd. as ⟨54⟩ 111.23.)
.319 — — Springs
.435.31 — — Polarization of rays.
.34 — — Absorbtion of rays.
.441.174.4 Radioactive electrolysis.
.618 Secondary radiations.
.63 — — Roentgen rays.
⟨54⟩ 111.431 Density
.432 Viscosity
.436 Specific heat.
.439 Cohesion
.524.17 — — [This should be used for articles referring to two or more chapters of ⟨54⟩ 11. For articles referring only to ⟨54⟩ 117, ⟨54⟩ 117.15 should be used instead].
.9 Applications of a theory to other phenomena.
112.8 Liquid types. Special liquids.
.892 Gelatinous liquids.
114.22 Osmotic pressure (as phenomenon)
(as property see 114.72)
.224 — — Boiling-point raising; freezing-point lowering
.38 Varia of dissolving and solution.
.44 — — Adsorption
.66 — — „
.72 — — Osmotic pressure (as property)
— — Solution „ „ „
.74.. Dissociation constants
.76 Thermal properties.
Latent heats. Solution heats.
.893 Eutectic alloys. Cryohydrates.
117.157. Electrochemical instruments. General.
Voltmeters. Ammeters etc.
.238.4 Dielectric constants
(See also ⟨621⟩. 315.6)

⟨54⟩117.241 Resistors. Alloys and metal. mixtures
Constantine, New silver, Manganine, Nickeline
.242 Imperfect contact conductors
Polariters. Coherers
.243 Transmitters. Microphones
.29 Static electric phenomena.
.338.. Dissociation constants
.339 Applications of dissociation theory.
To theory of indicators, — of fluorescence.
.425.1 General.
.2 Methods
442.2 Definitions. symbols, units of electrolysis.
.3 Laws „ „
Faraday's law.
.36 Formulae and constants.
The electrochemical equivalent.
444.4 — — Electrolytic reduction velocities (for organic comp.)
448.454 Electrolysis in magnetic field.
.491 — — Electrical endosmosis.
.8 — — Amphotere electrolytes.
.471 Theory of polarization
.475 Measurement of „
.51 — — Superposition principle.
.642 — — Copper oxide depolarizers. Cupron cell
.723.42 — — Ion velocities
.45 Electrification
.727 — — Eudiometers. Electromanometer flames
.736.2 Electrical evaporation.
.77 — — Conductivity of air
.813 Current generation by liquid flow in norrow channels (Strömungsströme)
18 — — Decay of metals
23 — — Hydrometry
26 — — Trituration, filtering
283.444 Adjustable electrode types (regulating electric flow)
.492 Processes for production of pure chemicals. 'C.P.'
284 — — (Subd. as 283)
285 — — „ „ „
287.2 Silent discharge processes
7 Arc „ „
289.1 Hydrogenation
.2 Static electric processes
.9 Magnetic „

6 [Affixes]

11.2 Acids
14.4 Hypobromites
18.6 Metaphosphates
19.142 Hydroarsenites
19.143 Arsenites
21.3 Anhydrides
22.32 Hydrosulphides
.33 Sulphides

⟨54⟩6 [Affixes]

22.42 Hyposulphites
.3 Sulphites
265 — — — Acid carbonates
99.71 Acetates

6 [Main subdivisions of each element-decimal:]
1 Element
2 Compounds (the element basic)
3 'ides' „ „ acidic) and General.
4 'ites' „ „ „
5 'ates' „ „ „
62 'per-ates' „ „ „
82 Alloys. (Specific — subd. as ⟨54⟩6.)

611.2 Acids
617.182 Air
621.18 Ozone
699 Organic compounds (reserved because of affix-use only)
711 Cyanogen
714 Halogen-cyanogen compounds
73 — — Carbohydrates

⟨621⟩.311.7 Apparatus in central stations
.314.7 Special D. C. to A. C. transformers
Wehnelt interrupters. Arc transformers
.317.9 Instruments and meters. Non-electric applications (Functioning electrically)
.326.193 Compound carbon filaments. (metal or metal oxide components)
.194 Graphitized filament types.

⟨621⟩.327.329 Various uses of mercury vapor lamps. As lightning arresters circuit-breakers etc.
.351.31. . — Ventilation
.4. Processes; of manufacture, etc.
Methods. Procedure. Instruments. Data
5. Measurements (Subd. as. ⟨54⟩111.5)
79. — — Battery houses and furnishings.
.352.44 With amalgam depolarizers (amalgamated electrodes)
.525 With permanganate „
.353.1 General.
.17 Constituent and accessory apparatus in service
.353 Movably shielded electrode types.
.357.1 Application of accumulators to central stations. General.
.2 „ „ „ to lighting (of cars etc.)
.3 „ „ „ to traction (see also .335)
364.91 Fuses. Mfg. of —
.92 Rheostats. Mfg. of —
.93 Optic-incandescent applications. Special. Mfg. of —
.366.3 — — Eudiometers. Mfg. of —
.372.22 — — Constantine, Manganene, New silver, Nickeline mfg.
.242 — — Decoherers. Polarization cells
.246 — — Spark arresters. Mfg. of —
.27 Conductors. Special mixtures etc.

⟨621⟩.29 Applications of chemical resistance and conductivity (Precise, definite)
.292 Liquid rheostats
.3 Electrode mfg. For arc lamps, etc.
.4 Wire „ For electric uses.
.377 — — Current shapers (A. C.)
.385.2 Electrothermal therapeutic apparatus.
.387 Manufacture of electric instruments (Subd. as. 317)
⟨661⟩.113.1 — — Pyrometry. Thermometry
.23 Fluxes
.113.727 Furnaces. Electric — (Subd. as ⟨621⟩.365)
.772 Silent discharge processes
.777 Arc „ „
.117 [Used chiefly under metallurgy ⟨669⟩.8.]
.118.17 Laboratories and equipment.
.13 [For salts with element in acid radicle see .69.]
⟨669⟩.758.6 Amalgams
.877.23 Electroplastics
.564.4 With movable electrodes. Rotating electrodes

Generalities
(01) — Methods. Philosophy
(02) — Charts. Tabular views, Compends. Manuals. Systems. Outlines.
(03) — Dictionaries. Lexicons.
(04) — Lectures. Letters. Papers. Tracts
(06) — Associations. Exhibitions. Reports. Transactions.
(07) — Education. Schools. Study. Museums. Laboratories.
(08) — Collections. Extracts. Libraries. Treatises Tables.
.009 Use.

Corrections.

⟨54⟩112.436 [Suppressed; see 114.224]
117.245 read 117.247
.425.2 „ 117.425.3
283.4 read 283.42 Classification by app.
287.2 „ 287.5
.5 „ 287.4
5 Quantative read Quantitative
6 [Subdivisions of. 1 of each Element-decimal.]
1 Forms of the element. General
2 Solid forms
3 Crystalline forms
4 Amorphous „
5 Colloidal „
6 Liquid „
6 [Affixes]
.266.1 read 266.2
.266.2 [Suppressed; see .265]
.668.2 read .668.3
.3 „ .4
.716.1 „ .716.2
.766.1 „ .766.2
.2 „ .3
.97 „ .99
.971.3 „ .991.3
669.3 [Suppressed]
698 read 698.1
⟨621⟩.372.247 read .372.25
.378.13 [⟨663⟩.637 suppressed]
.378.7 read .377.7
⟨661⟩.11 — (Subd. as ⟨661⟩.0) read (Subd. also used in metallurgy)
.113.772 read .113.775
.113.775 „ .113.774
.116.86 [Suppressed]
118.6 — .118.9 [⟨669⟩ read ⟨661⟩]
.121 read .122
.122 „ .123
⟨669⟩.877.321—8 [For ⟨66⟩ read ⟨669⟩.877.48.]
.324 read .325
Generalities
(02) [Treatises see (08)]

The Alphabetical Index

to the Code of Classification of Electrochemistry.

Very few who will use the code, either to search thru our card references or to classify their own personal notes, can afford the time necessary to secure a working familiarity with all of its parts, or to prevent overlooking decimals where certain relationships of a subject have been treated. The alphabetical index then, becomes a need and has therefore been prepared. The English edition is here presented.

In preparing this index the rule has been followed in general not to include subdivisions under any leading word in the decimal symbol of which, the decimal symbols of such subdivisions are contained. *)

For those unfamiliar with bibliographical practice it has been thought that the rules for combining the symbols of the code might not be clear; therefore not only the chemical elements, for instance, but many of the more common compounds with their combination-symbols are here included. **)

The decimal following 'in chem' after a given subject refers to its pure science treatment; that following 'in mfg. of chem' refers to its applied science treatment.

That part of the decimal symbol included in 〈 〉 appears as the 'signature' at the base of the card. ***)

*) For instance, 'Polarization' 〈54〉 117.47, is given; but not 'Polarization by gases', the decimal for which is 〈54〉 117.473. 'Polarization of accumulators' is given however, as its symbol, 〈621〉.355.132.3 is not included in the decimal for 'Polarization'.

**) Attention is called to the construction of these combination-decimals which permits of classification under the base or acid radicle by simple reversal of the parts combined.

***) 〈669〉.357.5.003 on page 5 of the code illustrates this.

Abbreviations.

anal. = analysis; chem. = chemistry (or chemical); comp. = compounds; electropl. = electroplating; elec. = electricity (or electric); engin. = engineering; exper. = experimental; mfg. = manufacture; met. = metallurgy phys. = physics (or physical); prop. = property.

Abrasion (electropl.) ⟨669⟩.877.523.1
Accidents in manufacture .004
Accumulators
— in automobile technique ⟨621⟩.335
— in electric traction ⟨621⟩.357.3
— Standpoint of applications ⟨621⟩.357
— Standpoint of mfg. ⟨621⟩.355
— — Apparatus for ⟨621⟩355.17
— Standpoint of service ⟨621⟩.356
— Tech. prop. of ⟨621⟩.355.13
— Theory of ⟨54⟩117.65
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— in mfg. of chem. ⟨661⟩.771
Acetic acid in chem. ⟨54⟩71
— in mfg. of chem. ⟨661⟩.771
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Acetylenes in chem. ⟨54⟩723
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Acid halides. Organic ⟨54⟩77
Acidity ⟨54⟩14
Acids. Inorganic. in chem. ⟨54⟩611.2
— — in mfg. of chem. ⟨661⟩.2
Acids. Organic. in chem. ⟨54⟩77
— — in mfg. of chem. ⟨661⟩.77
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Acids. Theory of ⟨54⟩14
Actinium in chem. ⟨54⟩684.21
— in radioactivity ⟨53⟩525.316.842
Actinometers. Electrical
— in phys. chem. ⟨54⟩117.68
— Mfg. of ⟨621⟩.358
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— Radioactivity of ⟨53⟩525.319
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— in met. ⟨669⟩.73
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— of molybdenum in met. ⟨669⟩.276
— of nickel in met. ⟨669⟩.256
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— — in mfg. of chem. ⟨661⟩.1 66.3
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— — in mfg. of chem. ⟨661⟩.113.763
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